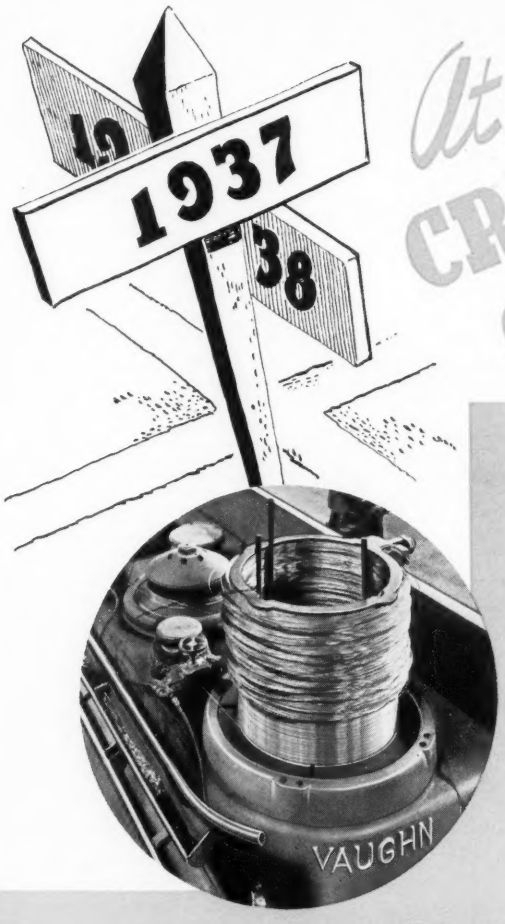
DECEMBER 1937

WIRE AND WIRE PRODUCTS



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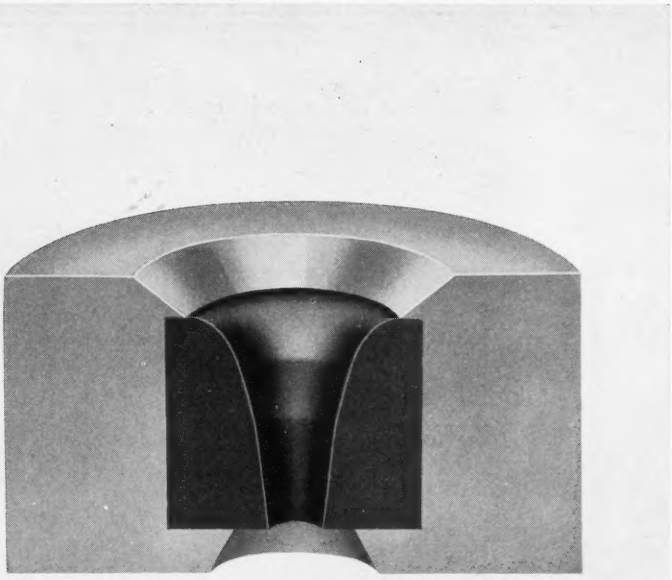

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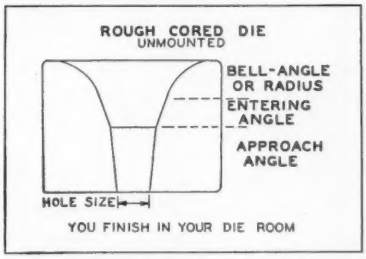

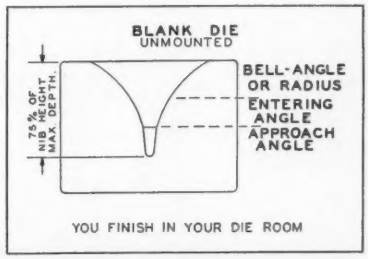

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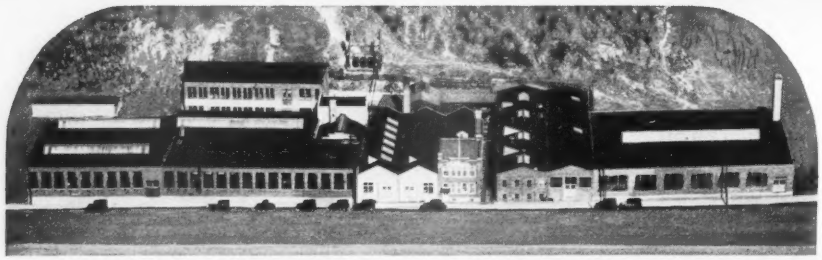

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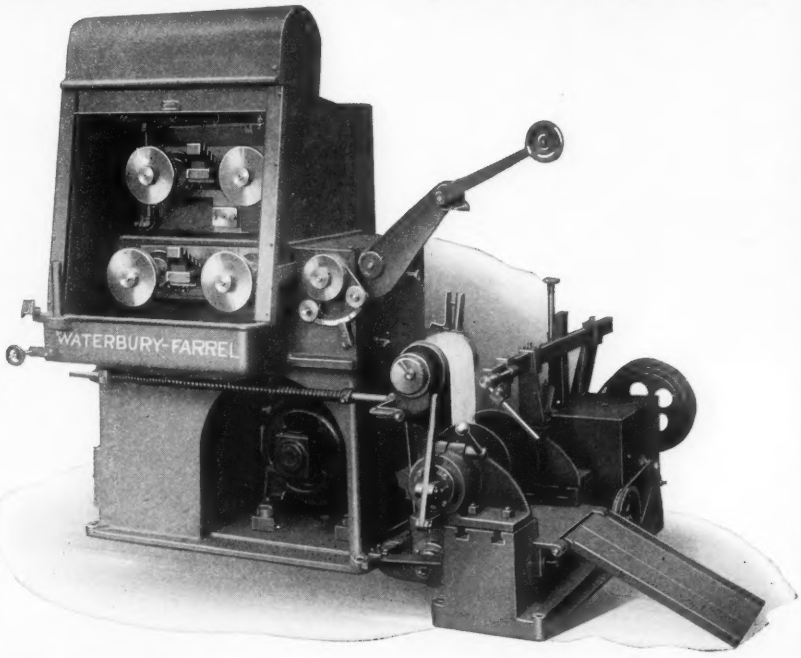

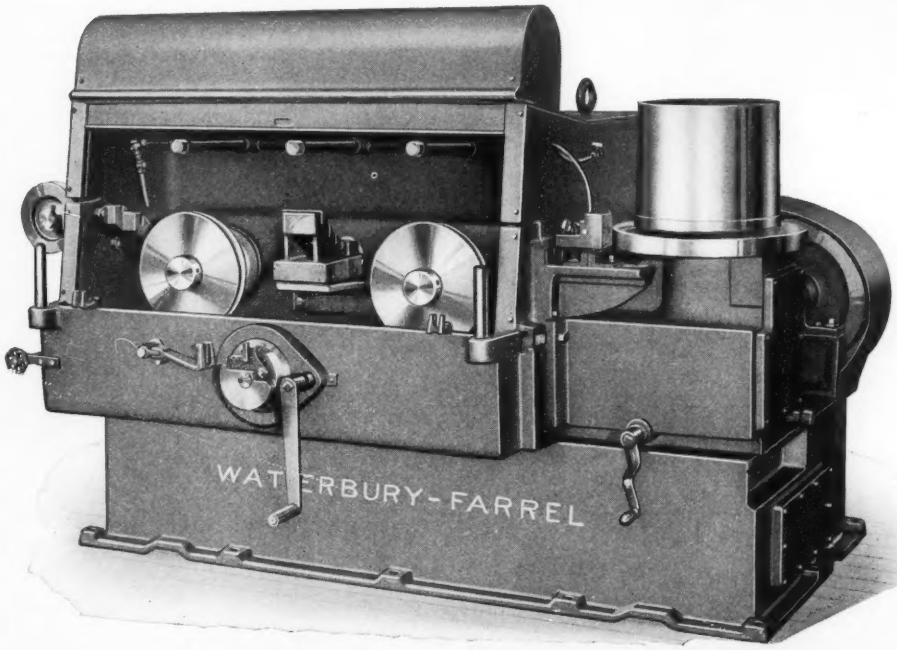

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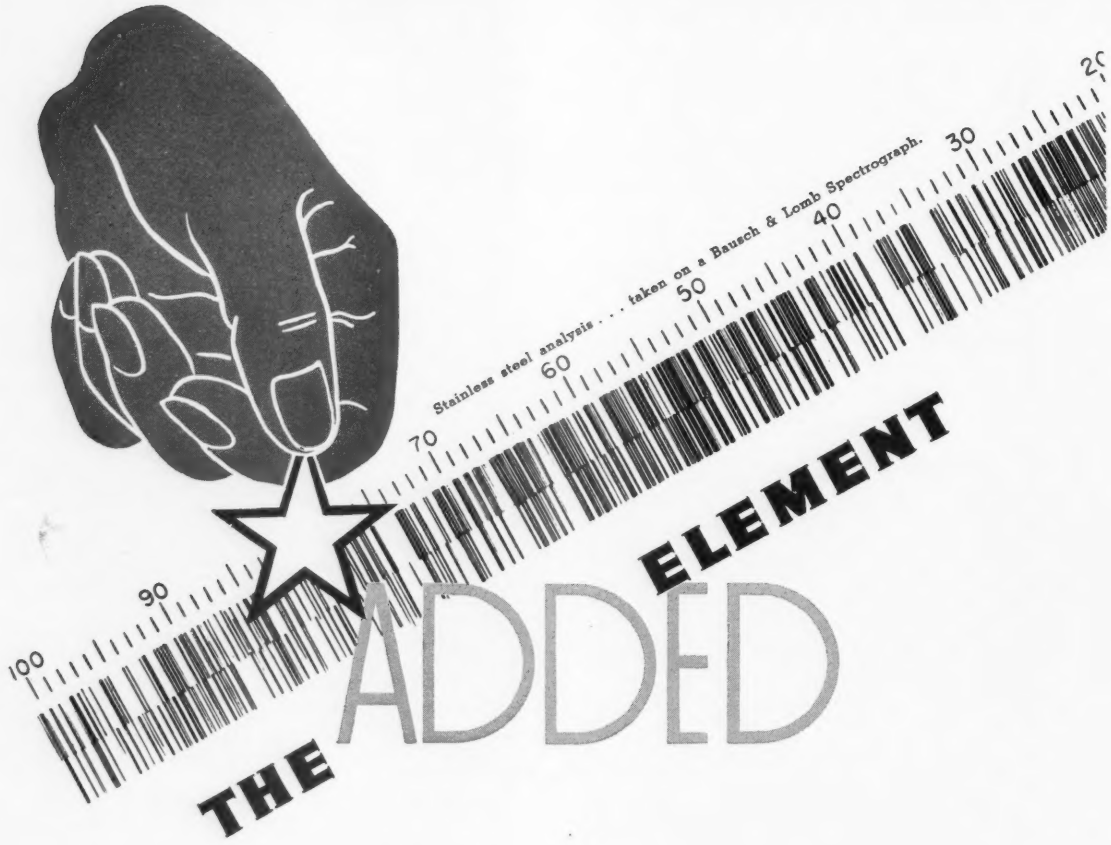

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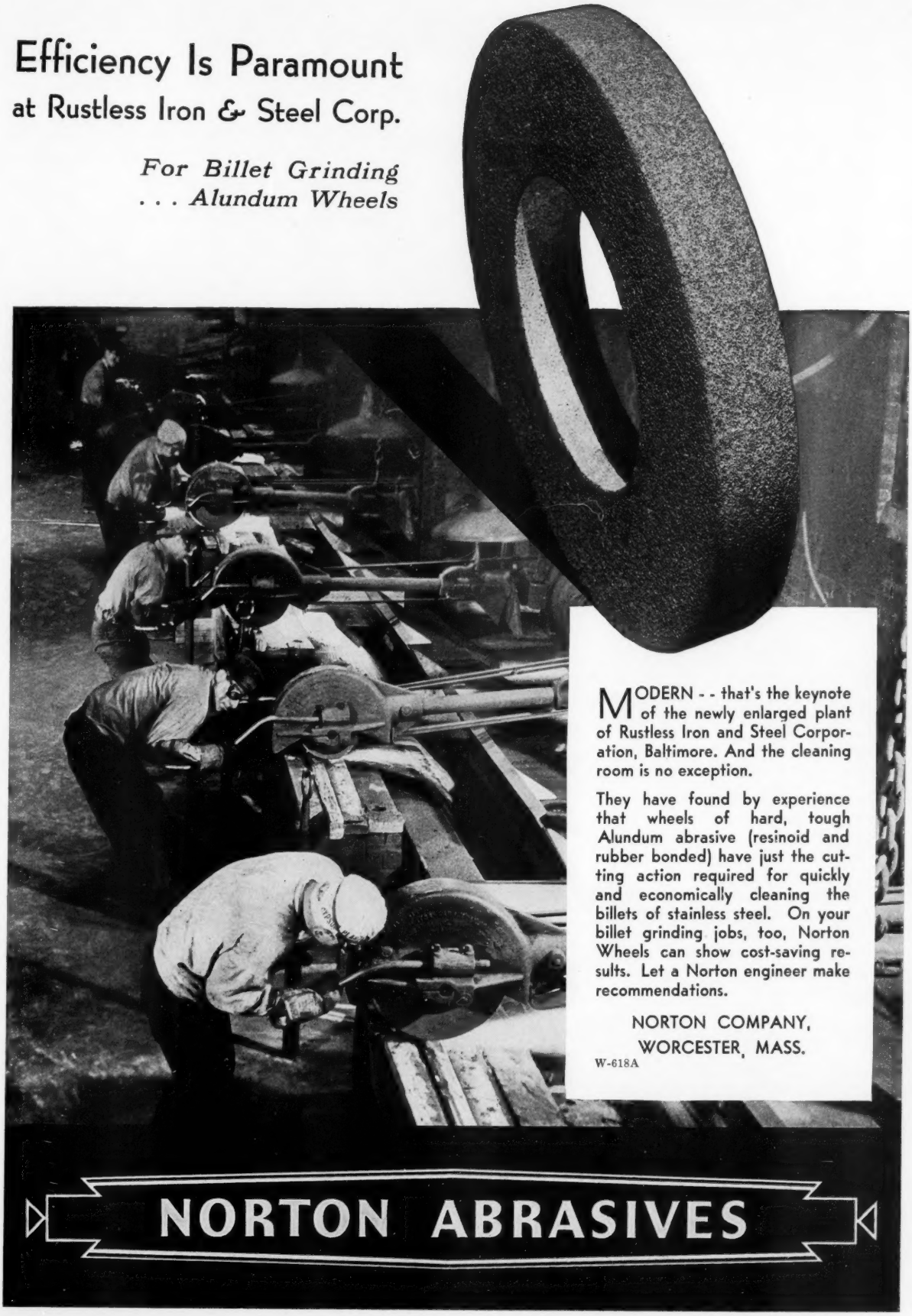

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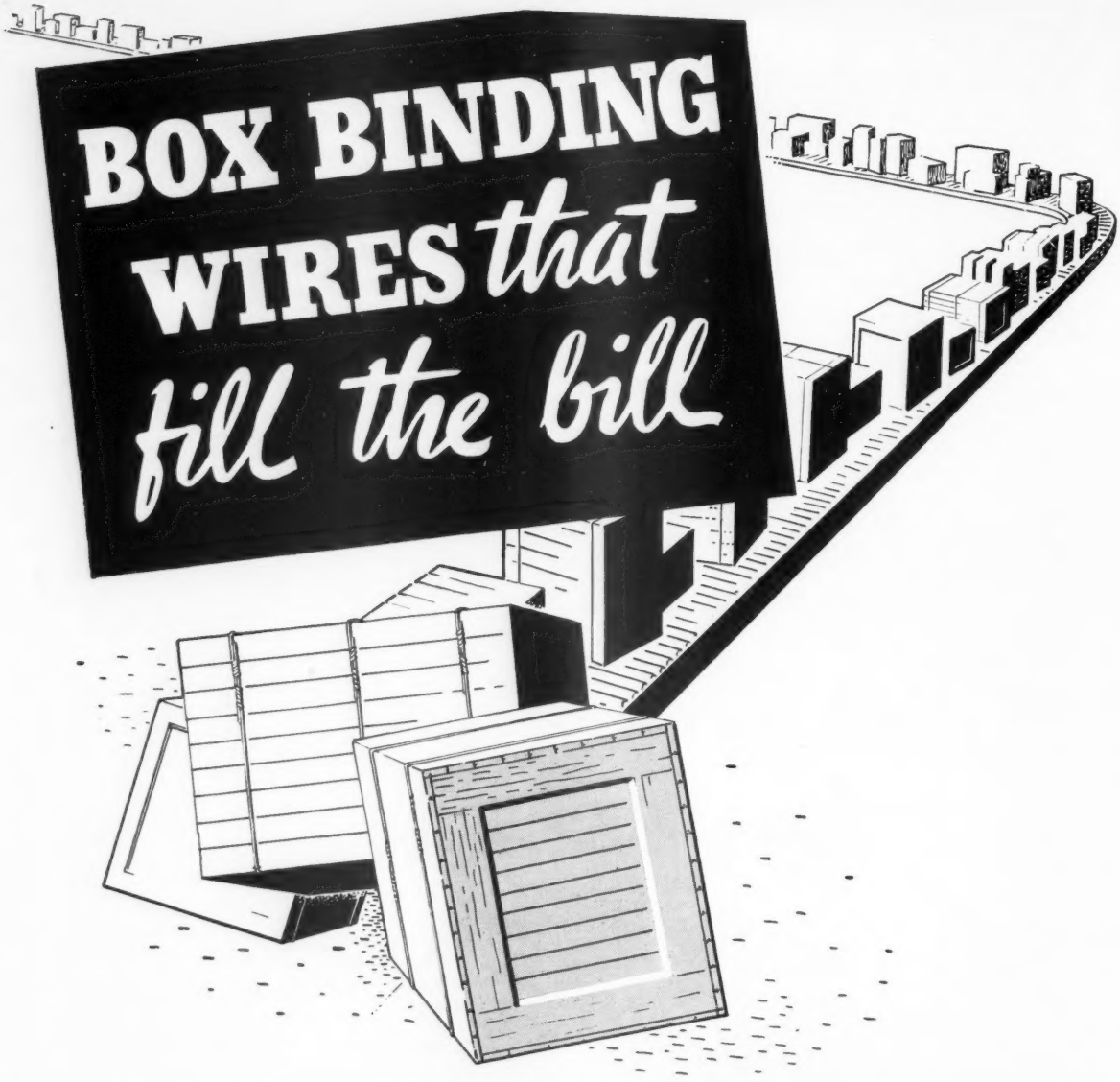

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DRAWING—ROLLING—EXTRUDING—FORMING—FABRICATING

Vol. 12 DECEMBER, 1937 No. 12

Designated as

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DRAWING --- ROLLING--- EXTRUDING --- FORMING --- FABRICATING

Vol. 12 DECEMBER, 1937 No. 12

Electrodeposition of Wire Drawing Lubricants

By Robert C. Williams,
Chief Chemist, The Ironsides Co.,
Columbus, Ohio

An investigation of wire drawing lubricants with particular reference to results obtained through electrodeposition. ✦

THE field of lubrication as applied to wire drawing affords an example which shows the advantage of employing relatively thick films of solid lubricants. An earlier paper by this author (1) has demonstrated this for a particular class of lubricants from a laboratory standpoint and the use of soap powders bonded to limed rods is, of course, general practice familiar to all.

✦ ✦ ✦

THICK films of lubricants are commonly applied to rods and wire by dipping, brushing or spraying preparatory to drawing. In general, it is necessary to dry or bake the rods to obtain strongly adherent films of a thick solid nature.

✦ ✦ ✦

THE investigations of wire drawing lubricants conducted by this laboratory have involved the study of various factors concerned with the use of soaps, emulsions and dispersions of various types.

✦ ✦ ✦

IN wet drawing practice, absorption, broadly interpreted, is responsible for the lubricating action when drawing wire through a die (2). It therefore appeared that concentrating on the wire the lubricant contained in a wet drawing solution would result in superior lubrication. The idea of using a potential difference between the wire and another electrode was conceived. In other words, it was thought that if the wire to be drawn were placed in or passed through a wet drawing solution carrying an electric charge opposite in sign to that carried by the dispersed lubricant, a concentration around or a deposition on the wire would be produced.

✦ ✦ ✦

EXPERIMENTS were consequently undertaken to investigate this suggestion. It should be borne in mind that these early experiments reported here were carried out using slow speed, laboratory equipment and rather small wire for the sake of controlling conditions more precisely and learning something about the factors involved. At the conclusion of this paper some remarks concerning practical possibilities are made.

✦ ✦ ✦

Apparatus and Procedure

MEASUREMENT of the pull on the die provided a means for evaluating the factors involved in lubrication as influenced by electrodeposition. The apparatus consisted of a glass tube which was clamped horizontally to a deflectable, steel dynamometer plate. (See Fig. 1). The die was mounted axially to the tube in this plate so that the wire passed through the tube, which served as the electrodeposition cell, and then directly through the die. A glass tube was used for purposes of observation and it was therefore necessary to insert an electrode into the tube alongside the wire to complete the circuit. A carbon electrode was used. Had a metal trough or tube been used it would have served as the other electrode. Storage batteries supplied voltage up to 30 volts. A resistance placed in parallel provided a means for varying the voltage and a sensitive ammeter registered the current flow.

THE cell was closed by means of a rubber stopper and was filled with various drawing solutions. The dynamometer was calibrated so that deflections measured in thousandths of an inch, by means of a dial gauge, represented the total pull on the die. The speed of drawing was one foot per minute. Higher speeds did not influence the pull. The back pull necessary to keep the wire taut was slightly less than one pound and was kept constant.

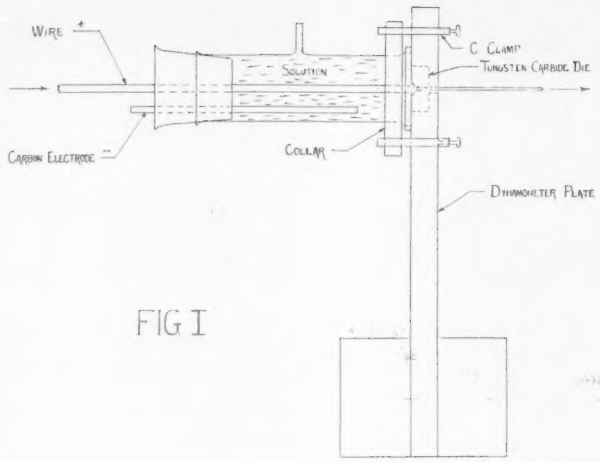

FIG I

✦ ✦ ✦

THE percent reduction in pull on the die refers to the ratio of the total pull obtained with the potential applied—to the total pull using the lubricant solution with no potential applied. (The per cent reduction would be much greater, of course, if the total pull with the potential applied was compared to the total pull with no lubricant at all.)

✦ ✦ ✦

Experimental Results and Discussion

THE effect of the electrodeposition of lubricant from a .225% solution of sodium soap (made from a fatty acid of 40.8 titre) on the drawing of .0253 inch soft copper wire through an .0225 inch tungsten carbide die is shown in Table I. This solution had a normal p^H of 9.5.

✦ ✦ ✦

THE results in Table 1 show that when sufficient voltage was applied to cause an appreciable current to pass through the cell, a very pronounced reduction in pull was effected. Simultaneous with current flow a greenish coating visible to the naked eye was deposited on the wire.

✦ ✦ ✦

IT is believed that the lubricating film deposited on the wire in these experiments and which was primarily responsible for the enhanced lubrication was copper soap formed by the union of the fatty acid radical ions and copper ions from the wire. In the earlier paper (1) dealing with wax-like lubricants, copper oleate was also very effective. In that paper it was pointed out that three conditions relative to the unusual effectiveness of wire drawing lubricants must be satisfied. (1) The lubricant must adhere strongly to at least one of the surfaces—the wire or the die; (2) the lubricant must be solid prior to being subjected to the relative shearing of the surfaces to be lubricated; and (3) the lubricant must melt or be transformed to a fairly mobile liquid between the surfaces while shearing takes place. Copper soap made from a fatty acid of 40.8 titre satisfied these conditions.

✦ ✦ ✦

THE above experiments were repeated but the p^H of the .225% soap solution was deliberately altered by adding acid (HCL) to decrease it and caustic soda to increase the p^H. No other conditions were changed and the results are presented in Table II.

✦ ✦ ✦

IT is not difficult to interpret these rather remarkable results on the basis of previous work done on the mixing of fatty acids and copper oleate which resulted in the loss of adhesion of the wax-like copper oleate. Using the solution having a p^H of 7.5 the free fatty acid, set free by adding the acid, was deposited on the wire simultaneously with the formation of copper soap. Loss of adhesion and therefore superior lubrication was experienced.

✦ ✦ ✦

AT the higher p^H values together with higher voltages there was considerable gassing on the wire due to oxygen being liberated from the caustic soda. This resulted in loosening of the lubricant film and no doubt accounted for the erratic results. Similarly with the low p^H solution where hydrochloric acid was added, chlorine gas was released at the higher voltages.

✦ ✦ ✦

THE large reductions in pull on the die with the higher p^H solutions using voltages of 7.5 and 15.0 are believed due to the fact that the relatively small amount of fatty acid occurring in the p^H 9.5 solution was neutralized by the excess caustic soda.

(*Please turn to Page 790*)

TABLE 1
ELECTRODEPOSITION OF LUBRICANT FILMS

0.225% Sodium Soap Solution, p^H 9.5
Drawing .0253 soft copper wire.

Volts	Amperes	Per Cent Reduction in pull on the Die
1.0	.000	0
1.9	.001	29
3.75	.003	29
7.5	.007	33
15.0	.013	36
22.5	.022	36
30.0	.030 to .038	40

Drives And Control For A Modern Rod Mill

R. H. Wright,
Steel Mill Engineer,
Westinghouse Electric & Mfg. Co.

B. J. Auburn,
Control Engineer,
Westinghouse Electric & Mfg. Co.

Successful rod mill operation is largely due to accurate speed control. Devices to accomplish such control are described here.

THE production of rod, the raw material for wire drawing, is a highly specialized undertaking. Large tonnages of No. 5 rod, which has a diameter of 0.207 inch, are used in drawing small and medium sizes of wire. Large wire sizes are drawn from rod ranging up to about one-half inch in diameter.

✦ ✦ ✦

ONE of the large steel companies has recently placed in operation at Joliet, Illinois, two duplicate continuous rod mills designed for quantity production of steel rod of high quality. Each mill has a continuous, gasfired heating furnace into which cold billets $2\frac{5}{16}$ inches square and 30 feet long are charged. The heated billets pass completely through 19 sets of rolls in approximately 75 seconds and the finished No. 5 rod leaves the last roll stand at a speed of 3500 feet per minute. In this short time the original 30-foot billet has been elongated to about 4500 feet. Two strands can be rolled simultaneously, so that two rods 4500 feet long, 0.207 inch in diameter and almost white hot are delivered from each mill every 75 seconds.

✦ ✦ ✦

ONE of the principal considerations in operating a mill of this type is the disposal of the finished product as it is delivered from the mill. To accomplish this, each mill is equipped with six reels into which the hot finished rod is coiled as it leaves the mill. A system of pipes makes it possible for the operator to direct each successive rod into the desired reel. Although only two strands can be delivered simultaneously from each mill, six reels are required for each mill because of the time required for acceleration, stopping, and unloading. All twelve reels are electrically driven and the equipment differs somewhat from that used in previous installations.

✦ ✦ ✦

EACH reel consists of a vertical spindle that carries at its base a circular steel plate on which are mounted two sets of vertical pins, located concentrically. A second movable steel plate with holes to clear the pins rests on top of the plate which carries the pins. The upper plate, on which the coil of rod is formed, can be lifted vertically by a hydraulic mechanism so as to clear the pins.

✦ ✦ ✦

IN making a coil, the reel is accelerated to the correct speed and the oncoming rod is directed between the two concentric rows of pins. The rod fills the annular space between the pin circles and forms a neat coil resting on the movable circular plate. When the coil is completed, the reel is brought to rest as rapidly as possible. The plate with its coil is lifted from the reel to a system of conveyors on which the rod is allowed to cool. The reels are mounted below the mill floor and the coils are discharged at the floor level.

✦ ✦ ✦

EACH reel is driven by a 125-hp, 230-volt, 400/1200 rpm, compound-wound, adjustable-speed motor. It is of the bracket type, has roller bearings, and has on the top half of bracket, openings and semi-enclosing screens on the bottom half. These motors are built for a temperature rise not exceeding 55° C. at 125 hp., 600 rpm., 230 volts. The operating speed of the motors is 140 to 520 rpm. by voltage control and 520 to 1200 rpm by field control. A speed of 520 rpm corre-

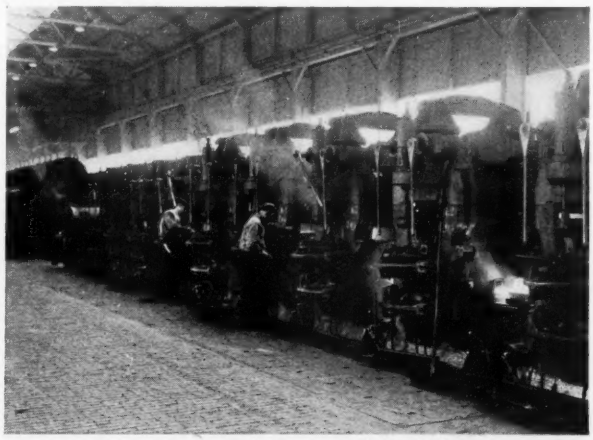

Fig. 1. General view of one of the new continuous rod mills of the American Steel & Wire Company at Joliet, Illinois, showing the roughing stands, the intermediate stands, the flying shear and the finishing stands. There are 19 stands in all completely equipped throughout with anti-friction bearings, the first time this had been done in rod mill construction. The result is greater accuracy, speed and less noise. When a No. 5 rod leaves the 19th stand, it is traveling at a rate of 40 miles per hour. ✦

sponds to 300 volts on the armature, supplied from a 75/300 volt variable-voltage bus. The motor fields are excited from a 250-volt exciter circuit. The motors are arranged for horizontal mounting and drive the reels through bevel gears. A shunt-wound, marine-type, magnetic brake mounted on the reel drive shaft assists in bringing the reel to rest after each coil is completed.

✦ ✦ ✦

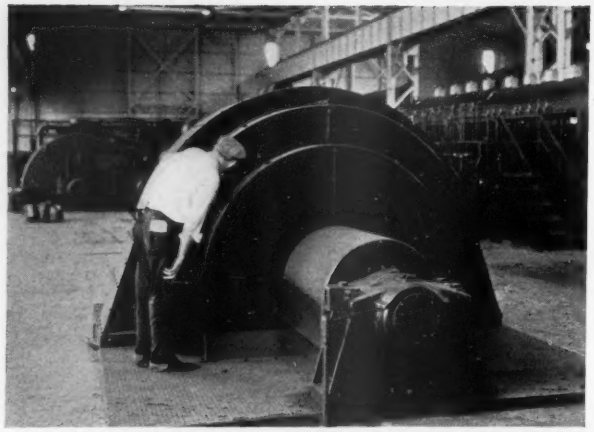

Fig. 2. The electric motor which supplies the power for all of the rolls in one of the mills. This 4,500 H. P. motor drives all of the rolls of the 19 passes in each double strand mill. ✦ ✦ ✦ ✦

THE power for each group of six reel motors is delivered by a 300-kw, 75/300 volt, shunt-wound separately-excited generator. These two generators and a 500-kw, 250-volt generator for the mill auxiliaries are driven by a 1600-hp, 6600-volt, 60-cycle synchronous motor. The excitation and control circuits are supplied from a 40-kw, 230 volt, shunt-wound, direct-connected exciter. The synchronous motor is started at full voltage.

✦ ✦ ✦

TO withstand the unbalanced weight of 400-pound coils with this mean diameter traveling at a speed of 40 miles an hour, the reels have to be of heavy construction. The flywheel effect, accordingly, is quite high. Furthermore, the time for acceleration and deceleration is limited, thus imposing severe duty on the driving motors and control. The normal time for one complete cycle is about 60 seconds, of which 7 to 8 seconds is for acceleration, 30 seconds running at full speed, 6 seconds for deceleration, and the remainder with the reel at rest for discharge of the coil.

✦ ✦ ✦

A SEPARATE control panel is provided for each reel motor, with the following operating features:

1—Time limit acceleration to base speed is obtained with a five-point, four-step starting resistor. The resistor is designed to give 100% full-load current inrush on the first point for about 0.3 second and approximately 190% on each successive step including the last step. The first inrush barely starts the reel, without shock, thus reducing the shock effect of the second inrush, of 190%.

2—Full-field excitation is maintained during acceleration on resistance by a field relay. As soon as the last resistance step is cut out this relay functions to bring the motor to full speed or a speed determined by the position of shunt field rheostats. The armature current during acceleration by field fluttering is maintained at 165% current.

3—Deceleration to base speed is brought about by a field-fluttering relay and from base speed to standstill by timing relays and three steps of dynamic braking. The current is limited to 140% full load to base speed and to 75% on the first point of dynamic braking and 125% on the second and third points. The shunt brake is applied about the time the second dynamic braking point is cut out.

✦ ✦ ✦

A UNIQUE feature of the control are the operator's benchboards one of which is provided for the reels of each mill. The benchboard shape eliminates all unnecessary moves on the part of the operator. Standing in front of the middle section the operator has all six controls within his reach. Each of the six sections of the benchboard has both control switches and hydraulic valve control levers. The hydraulic levers by which the movable plate of the reels is raised and lowered are electrically interlocked to control the starting and stopping of the reel motors at the same time. When a finished coil is raised to the discharge position the reel is stopped. When the movable plate is lowered to the position to receive a new coil, the reel is started automatically.

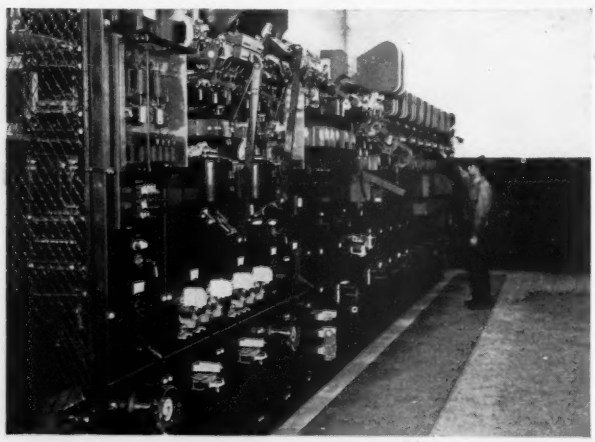

Fig. 3. Incoming power control board. One of the broad-range voltage regulators for the reel generators is shown at upper left. ✦ ✦

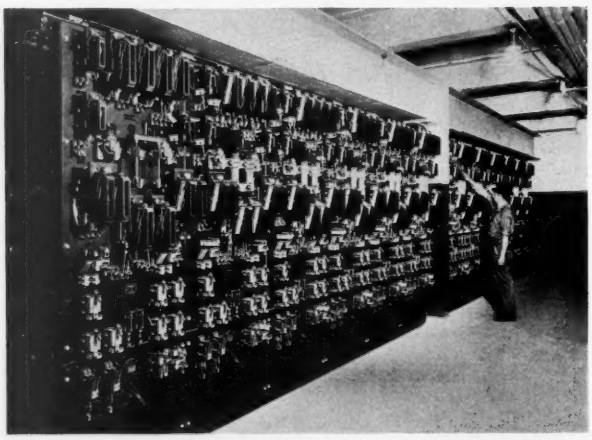

Fig. 4. These panels (6 in each group) control the twelve electrically driven reels. ✦ ✦ ✦ ✦ ✦

THE top of the benchboard also carries control switches for the main and vernier rheostats, which regulate the speed of the reel motors. The main rheostat is used for rough preliminary adjustments and the vernier rheostat for final speed adjustment during coiling. The position of the vernier rheostat is indicated by a synchro-tie transmitter and position indicator mounted on top of benchboards. The motor ammeters and speed indicators are mounted on a steel panel above the windows in the control pulpit and slightly above the operator's line of vision.

✦ ✦ ✦

WHEN a mill is in full production two reels are receiving rods and the others are either accelerating, decelerating, stopped, or idling. This condition imposes considerable load fluctuation on the reel generators. It is of absolute importance that the voltage of the reel generators remains constant at all times. To secure constant voltage, each generator is provided with a voltage regulator. The regulator is of the broad-range type since voltages from 75 volts to 300 volts are being employed depending on the product rolled. The regulated voltage assures constant speed of the reel motors and proper matching of their speed to the speed of the last stand of the mill.

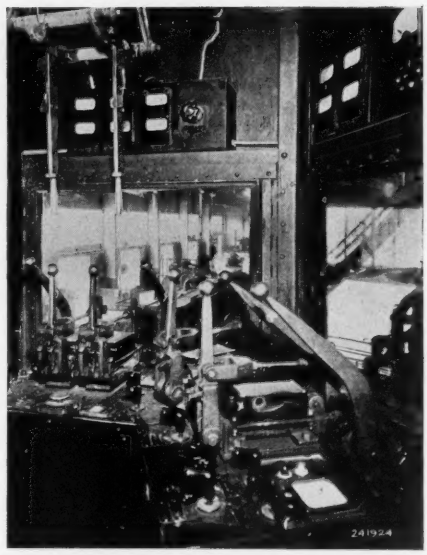

Fig. 5. Operating pulpit for controlling six of the reel motors. A similar pulpit controls the other six.

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A CONSIDERABLE amount of water is used by mills of this type so the mill proper is elevated to 14 feet above the ground level to insure good drainage. Space is available, therefore, on the ground level for reel drives, control equipment, oil tanks, etc. The control panels, starting resistors, rheostats, etc., are located in the control room almost immediately below the operating pulpits, a design which lends itself readily to a simplicity and economy of the whole installation.

More About Charged Agricultural Fences

THE article published in the July issue of "WIRE & WIRE PRODUCTS" with the title of "Charged Agricultural Fences", was commented upon by other writers in rebuttal in the August issue of the publication.

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THE comments caused the author, Mr. Jack Delmonte, now assistant chief engineer of research and development of Chicago Flexible Shaft Company, to investigate further the subject of electrical fences and he has made the further following comment:

"When I first wrote the original article, which appeared in July issue, it was my intention to suggest a new and growing market for wire products — leaving interested manufacturers to carry further the study of the possibilities. Naturally, random application of electricity to fences is hazardous, and careful judgment and precautions must be exercised. Fatalities have been known to occur when prescribed precautions were not observed. My short article, in no whit, made a pretense at outlining the procedure in applying and controlling electrical fences.

"However, the fact remains the U. S. Department of Agriculture and the agricultural departments of several states have investigated and indorsed several types of electrical fences and controllers, which provide adequate safety features. These and other regulations must be looked into, before a wire manufacturer enters the field—this procedure is obvious. In some states as Wisconsin, regulations exist regarding the sale and manufacture of electrical fences, but not prohibiting their use.

"If you feel that any of the above would serve a useful purpose by its publication, you are at liberty to do so. Should any further questions arise on electrical fences, I am prepared to answer them fully. I have been corresponding with a few authorities on this subject, and I am prepared to justify any of my earlier published remarks.

"As for present manufacturers of electrical fences, (1) The Prime Mfg. Co., 1669 So. First St., Milwaukee, Wis.; and (2) One-Wire Fence Co., 1005 Main St., Whitewater, Wisconsin, are representative."

✦ ✦ ✦

AT a recent meeting of the American Society of Agricultural Engineers held at Urbana, Illinois, with members consisting primarily of professors and instructors of Agricultural Engineering in colleges throughout the United States, Supervisors of Agricultural Extension, Engineering and Extension Workers in the U. S. Department of Agriculture, etc., discussions about electrically charged wires for fences cropped up from time to time. As a result a special session was called during the convention for consideration of the subject and the following general determinations resulted:

1. That considerable interest exists among farmers in the electric charged fence because of its economy and convenience for certain types of protection.

2. That agricultural engineers must concern themselves with the electric fence, study its possibilities, know of its dangers and insist that manufacturers produce a fence that will be safe and effective under all conditions.

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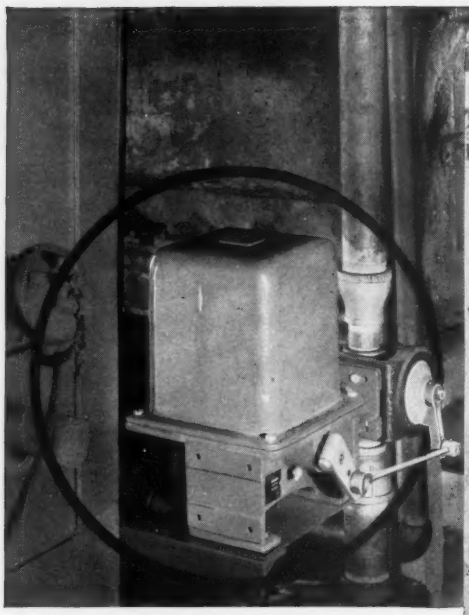
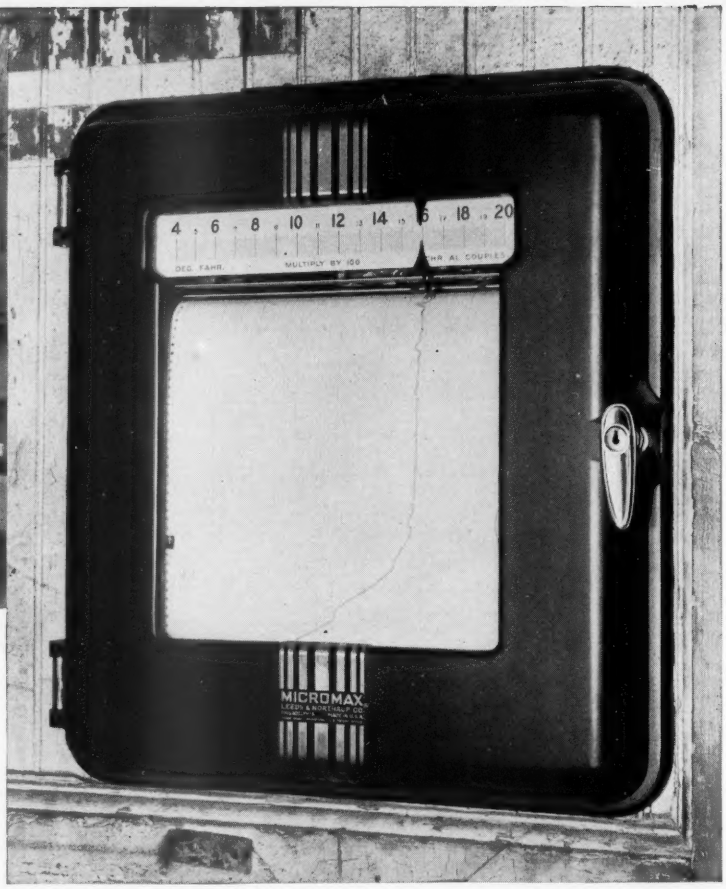
AT this meeting quite some alarm was expressed over the dangers of this type of fence, both with regard to the available commercial devices and the farmers' home made hook-ups, and the discussion developed that commercial transformer devices now on the market which are supposed to cut down the amount of current to a safe point some times stick and cause the death of live stock. Some engineers pointed out that if the device became wet a short circuit might result charging the fence wire dangerously. There was also pointed out by some of the electrical technicians present that the amount of fence connected to the transformer device had an important bearing upon the safety or danger of the electrical charge.

(Please turn to Page 797)



Above—Note the simplicity and compactness of Micromax Electric Control's Valve Drive in the circle.

Right—Directing the Control is this Micromax Recording Controller.



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Vol. 12 DECEMBER, 1937 No. 12

Thermal Treatment of Rods And Bolts

By L. S. Cooch,
Metallurgist, Buffalo Bolt Company,
N. Tonawanda, N. Y.

A paper presented before the Annual Wire Association Meeting at Atlantic City, N. J., October, 1937. + + +

THE exacting requirements of the users of bolts today necessitate the most rigid control of the preparation of the rods and the finished bolt. Close tolerances on thread sizes, decarburization in threads, tensile properties, narrow limits of hardness and physical structure demand the utmost care throughout the process of manufacture with the best equipment available. In this article we will not endeavor to explain all operations in the production of bolts and cap screws and will limit the explanation to the preparation of the rod and final heat treatment of the finished product.

+ + +

Spheroidizing Of Rods

RODS are spheroidized after rolling in a circular radiant tube gas furnace with a double sand seal to reduce oxidization of steel to a minimum. Coils are loaded on a spindle and placed on a base equipped with a reversible fan for uniform circulation, and an inner cover of heat resisting metal is then placed over the spindle, fitting down in a sand seal. Furnace is then set over the inner cover which also fits into a seal.

+ + +

TEMPERATURES are varied according to grade of steel and length of soaking time according to the size of the rod and the desired degree of spheroidization. Operating furnace specifications are a minimum of 70% spheroidization and maximum of 149 Brinell Hardness for SAE 1035 steels, 1335 and 3135 grades call for a minimum of 80% spheroidization and a maximum hardness of 163. These requirements are governed closely by the length of soaking time, uniformity of circulation of heat and controlled cooling. After charge is thoroughly soaked, the furnace is raised and placed on a base previously loaded, thereby, losing as little heat as possible in furnace and an insulated cooling cover is then placed over the finished charge and the temperature allowed to drop about 50° F. per hour to 1000°. The complete cycle of this change requiring 3 to 5

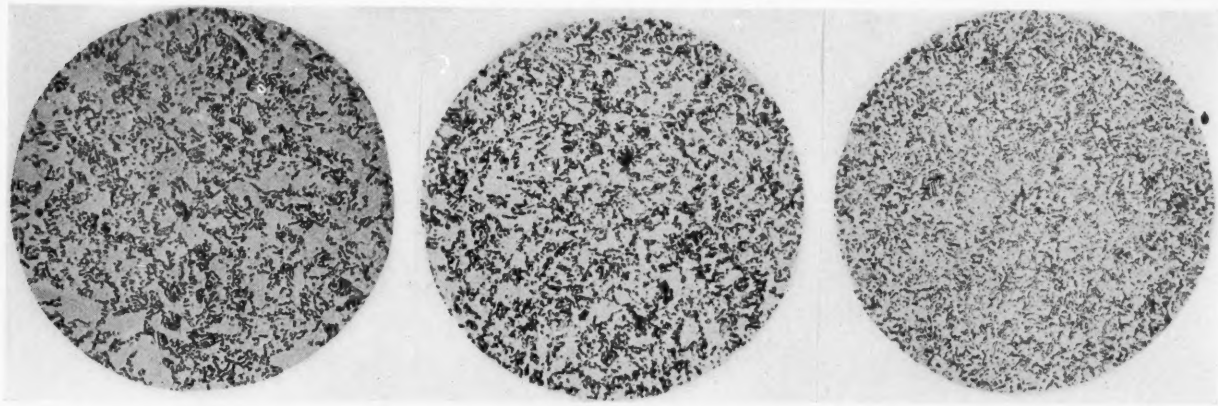

Figure 1. + + +

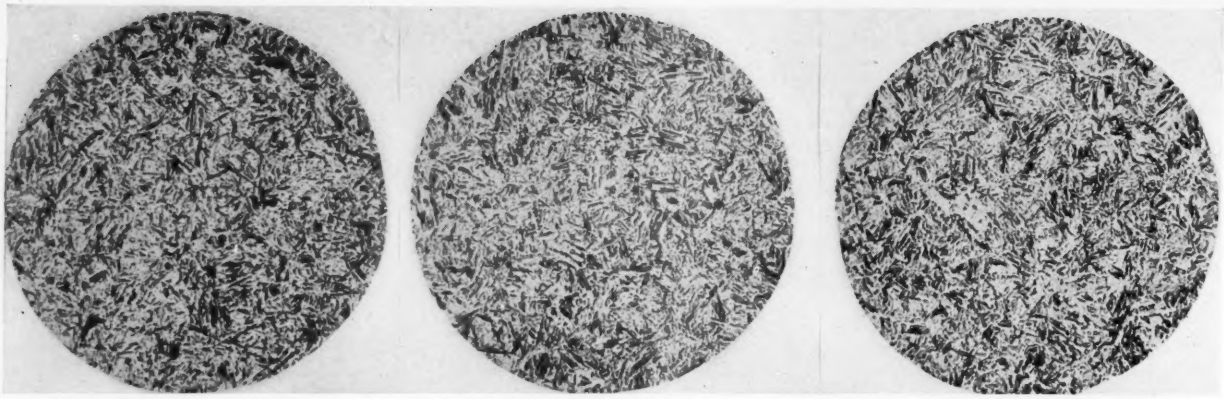

Figure 2. SAE 1035 Brinell Hardness—444 | SAE 1335 Brinell Hardness—477 | SAE 3135 Brinell Hardness—477

minutes. Heating to temperature ranges from 2 to 4 hours. Soaking time for SAE 1035 varies from three quarters of an hour to 2 hours and cooling time from 2½ to 5 hours. SAE 3135 and 1335 require a longer soaking period of 1½ to 3 hours, heating to a higher temperature than SAE 1035 the time lengthens from 3 to 5 hours and cooling time from 4½ to 7 hours. Temperatures are controlled within plus or minus 20° and uniformity is controlled by the reversing fan in the base. Figure 1 shows photographs of spheroidized structure, with Brinell hardness of these grades of steels.

✦ ✦ ✦

Heat Treatment of Finished Bolt

AFTER material is cold drawn to size and headed after various operations to produce the finished bolt it is ready for heat treatment. Hardening operation is conducted in an electrically heated furnace with heaters above and below the alloy belt which travels through the furnace at predetermined speeds. The gas atmosphere necessary to retain a reducing condition in the furnace is supplied by a separate gas cracker unit and the gas introduced at four different points of the main furnace.

✦ ✦ ✦

THE speed of the belt is governed by the size of the material and heat treated requirements. After material is thoroughly heated it is discharged through a sealed chute into an oil quenching tank. The one feature worthy of mention is the turbulence of the oil in quenching tank which is maintained by a 3 H. P. motor direct connected to a propeller which circulates the oil forward into and past the discharge chute causing a swirling action of the oil which carries the oil back down the sides of the tank passing through double rows of water cooled coils. To hold the necessary temperature of quenching oil, cooling coils may be cut in or off according to requirements.

✦ ✦ ✦

THE bolts, after leaving the quench tank, automatically pass into a rotary washer which removes oil and then discharges material into containers for tempering operation.

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FIGURE 2 illustrates the uniformity of quenched structure of SAE 1035, 1335 and 3135.

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Final Tempering

TEMPERING operations are carried out in electrically heat-

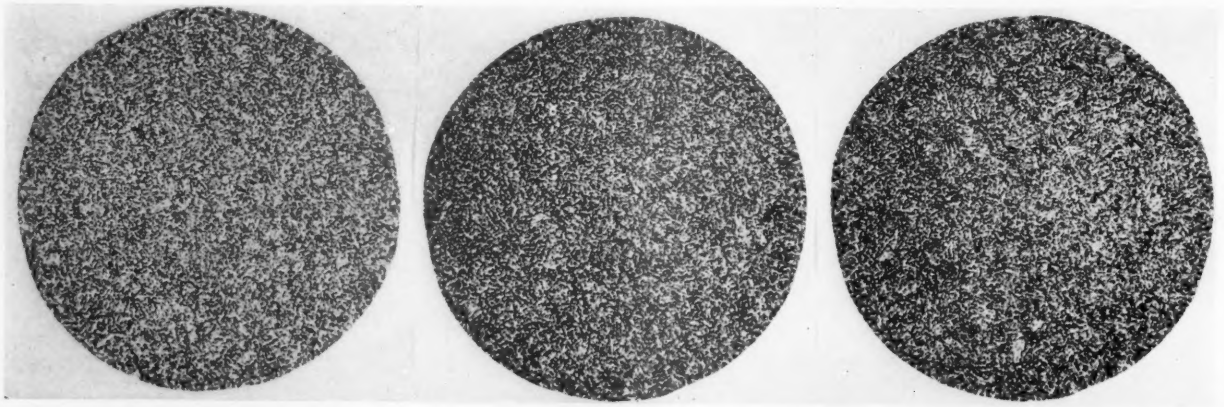

Figure 3. SAE 1035 Wire Size .450" | SAE 1335 Wire Size .450" | SAE 3135 Wire Size .450"

ed furnaces equipped with recording potentiometers for close control. Each load is drawn to meet the specified requirements as to hardness and tensile properties, this being checked by the furnace operator and inspectors.

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MICRO-PHOTOGRAPHS, Fig. 3, are taken from final product.

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PHYSICAL properties of the finished product are shown in Table A for various sizes and grades and are an average of 10 samples taken from production runs.

✦ ✦ ✦

Summary

THE close control of temperatures of soaking and cooling in the spheroidizing furnaces, with the even distribution of heat, produces a rod of uniform structure and a more even distribution of the carbides. In our experience we have found that the use of spheroidized wire increases the tool life in the heading operations considerably.

✦ ✦ ✦

THE hardening operation requires the very best of furnace equipment to allow material to receive very even soaking heat without oxidization, thereby, eliminating possibilities of soft spots from scale and decarburization of the threads. Quenching arrangements to be such that each piece receives a quench that is uninterrupted with a controlled temperature of the oil.

TEMPERING requires flexible furnaces in which the different temperatures required for various materials and conditions can be changed from load to load. Furnaces must be so controlled to prevent localized hot spots in load and over-shooting of temperatures.

The paper originally scheduled to be presented by this author was entitled "Cold Heading".

Because of illness, Mr. Cooch was unable to complete the paper in time for presentation at the meeting and presented the paper printed herewith.

However, a more detailed paper by Mr. Cooch will be published in the January issue of WIRE & WIRE PRODUCTS under the title "Cold Heading".

TABLE A

SIZE	GRADE	MEAN DIA. OF THD.	TOTAL POUNDS	POUNDS SQ. IN.	BRINELL NO. SPEC.
1/4 x 1 USS	SAE 1035	.201″	3880	122,400	202-255
5/16 x 7/8 USS	SAE 1035	.258″	5500	105,350	202-255
3/8 x 1 7/8 USS	SAE 1035	.314″	8460	109,300	202-255
7/16 x 1 3/8 USS	SAE 1035	.368″	11750	110,550	217-269
1/2 x 1 1/2 USS	SAE 1035	.425″	17340	122,300	202-255
*1/4 x 2 1/4 SAE	SAE 1035	.215″	6340	174,150	341-388
*5/16 x 3/4 USS	SAE 1035	.258″	9750	186,800	341-388
5/16 x 1 USS	SAE 1335	.258″	6710	128,550	255-321
3/8 x 1 5/8 SAE	SAE 1335	.334″	13750	157,000	321-363
7/16 x 2 3/4 USS	SAE 1335	.368″	14880	140,000	302-341
1/2 x 4 3/4 USS	SAE 1335	.425″	18940	133,575	255-302
3/8 x 1 11/32 SAE	SAE 3135	.334″	12850	146,700	285-341
7/16 x 1 11/32 USS	SAE 3135	.368″	16620	156,350	285-341
1/2 x 2 1/2 USS	SAE 3135	.425″	21530	151,850	302-341

*These bolts are heat treated to customer's special requirements.

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Vol. 12 DECEMBER, 1937 No. 12

Electric Direct Resistance Patenting And Tempering of Spring Wire

By O. C. Trautman,

The Cleveland Electric Illuminating Company

For over a year The Cleveland Wire Spring Co., Cleveland, has used direct electric heat treating for the thermal treatment of spring wire. The following article deals with more recent developments of this process, wire patenting and the results obtained by this method of patenting. Part II

Electric Direct Resistance Tempering of Wire

AN installation of the new direct resistance process for the thermal treatment of wire at the plant of the Cleveland Wire Spring Company is shown in figure 11. The apparatus is unusually flexible, a wire tempering unit with the necessary equipment can be converted to a patenting unit in a few hours time.

✦ ✦ ✦

Annealing Stainless Steel Wire

THE Electric Direct Resistance process can also be used for the annealing of stainless and other austenitic steel wire since no difficulties are encountered in reaching the high quenching temperatures necessary. Photomicrograph, figure 12, shows the microstructure of an 18% Cr.—8% Ni. wire which was heated by the direct resistance method to 2100° F. and rapidly quenched to obtain the best physical properties for drawing to smaller sizes. After this treatment it was found possible to accelerate the speed of drawing and also to make larger reductions in drafting due to the finer grain.

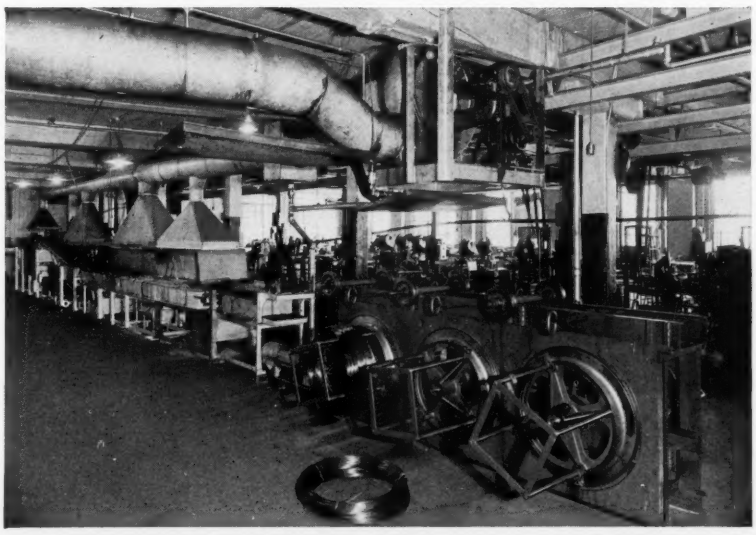

Fig. 11. A unit for the continuous heat treatment of wire by the direct resistance method at the plant of the Cleveland Wire Spring Company.

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Inadequacy of Present Oil Tempering Methods

IN a number of wire drawing plants, the present method of heat treating fails to give the highest physical properties desired or to consistently result in the optimum qualities from a given steel. The usual process of heat-treating carbon steel wire is to heat the wire to 1550° F. or higher by passing it through a furnace or lead pot and subsequently quenching in oil, after which it is reheated in a lead pot for tempering.

✦ ✦ ✦

IN this usual process, the heat is transferred to the wire from the outside inward, and before the inter-

ior has attained the temperature desired for quenching, the outside will have attained such a temperature, or even higher, for an appreciable period of time. This results in undesirable grain growth. Under such heating conditions it is not possible to quench the wire at the instant it has attained the desired degree of heat throughout its cross section, in as much as the temperature of the wire will have dropped before entering the oil quench on account of the space separating the oil quench from the furnace. In practice, under such methods, expediency in heating demands the use of a heating medium operating at a higher temperature than that actually required to heat the wire for proper hardening. Therefore the exterior of the wire is hotter than the interior at the moment the application of heat ceases. Moreover, as the wire is transferred from the heating furnace to the quenching bath it loses heat from the outer surface. Therefore, the temperature is not uniform throughout the cross section at the instant of quenching.

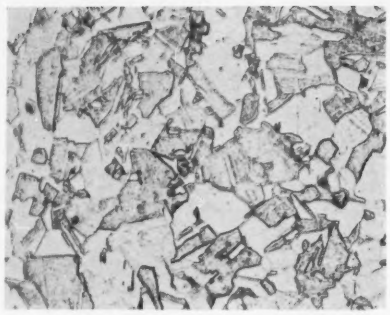


Fig. 12. Electrically annealed stainless steel wire 18% Cr., 8% Ni, X1000 Aqua Regia Etch.

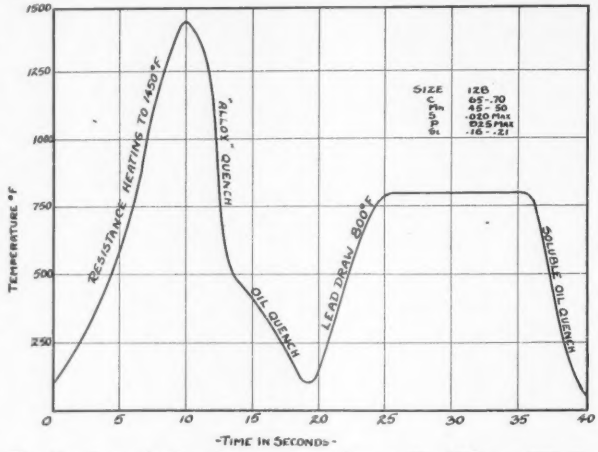


Fig. 13. Curve showing time vs. temperature on No. 10½ ga. .128" dia. wire, heated by electrical resistance and quenched on a rising heat.

✦ ✦ ✦

Electric Direct Resistance Tempering Process

IN the electric direct resistance process, an even rate of heating is secured throughout the cross section. This permits a heating rate of from 3 to 4 times faster than that which could be obtained by other methods of heating. The heating cycle is graphically illustrated in figure 13, which shows a heating rate of 150 degrees per second, on #10½ (.128") carbon steel wire. This rate may be increased to 400°F. per second, or decreased as desired. It is a well known fact that the grain size is dependent on the rate of heating and that a more rapid rate of heating yields a product with a finer grain. Consequently the finer grained product is tougher since it has more slip planes, between the individual crystals. An extremely fine grained martensite is produced by direct resistance heating and the combined "alloy"-oil quench. The microphotograph in figure 14 shows the unusually fine grained martensite produced by this method.

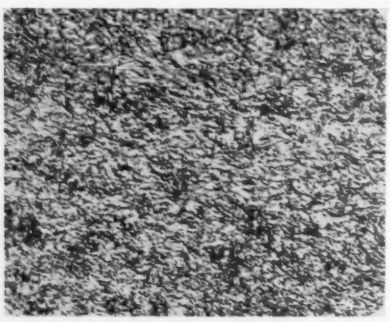


Fig. 14. Electrically heated and "alloy" quenched wire X2000. Note the unusually fine martensite and the absence of large needle formation.

✦ ✦ ✦

Transformation Rates

REFERENCE is made to the standard "S" curve, figure 15, showing transformation rates for a steel of the following analysis: C=.65—.70, Mn=.45—.50, S=.020 Max., P=.025 Max., Si=.16—.21. It has been found that on cooling a finer grained steel will begin to transform in a shorter time interval than a steel with a coarser grain. This shifts the "S" curve to the left. The phenomenon can be explained by the fact that a steel with a finer grain has more grain boundaries, and, since precipitation during quenching takes place in the grain boundaries, the finer grained steel has a stronger tendency to enter the precipitation zones. Because of this, the finer grain produced by resistance heating requires a faster quench than a steel with a larger grain produced by conventional methods of heating. Consequently a combination of a low melting alloy and a quenching oil is used for the cooling cycle. A comparison of the speed of this type of quench with the standard oil quench and air-cooling is made in figure 15. The quenching speed of this combined "alloy"-oil quench can be controlled by controlling the

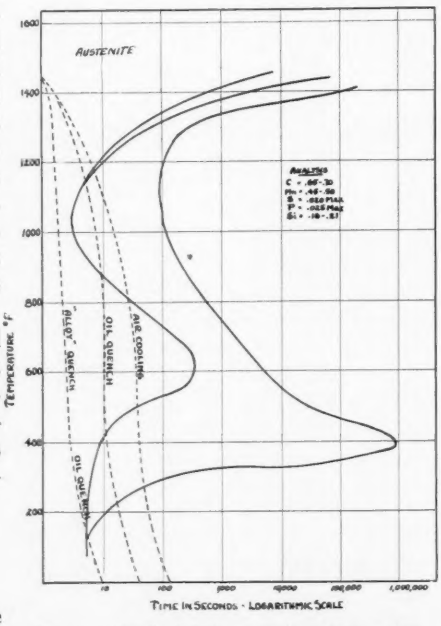
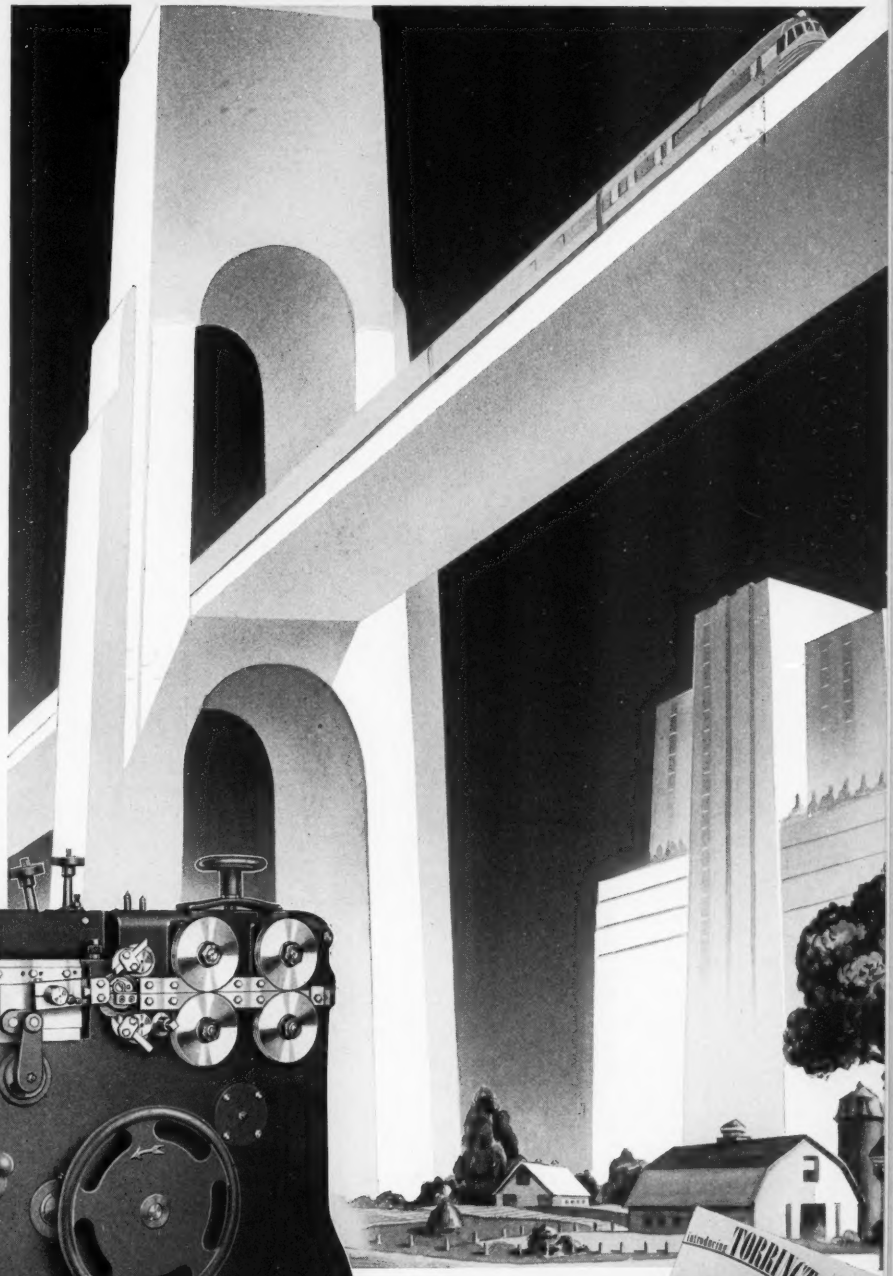


Fig. 15. Standard "S" curve for .65-.75 carbon wire illustrating the speed of transformation and comparing the speeds of "alloy"—oil quenching with the oil quench and air cooling.

TORRINGTON *Spring Making Machine*



A NEW ERA

Minimum set-up time and rigid, compact design for trouble-free performance are major features that distinguish TORRINGTON'S new, improved and modern line of Spring Making Machinery. High-speed, automatic, anti-friction segment and clutch type coilers are available in eight sizes. Range — .006 to 3/8 inch diameter wire. Listed below are other features of the new designs:

- High-speed production
- Timken bearing equipped
- Convenient, accessible controls for pitch, diameter, cut-off, etc.
- Simple feed adjustment
- Safety hand wheel
- Ample wire and coil capacity in each machine
- Square, clean cut ends
- Production speed variable either by change gears or standard variable speed unit
- Wire feed on clutch type adjustable through fixed center change gears or sliding gear box

Attachments available for coiling square or odd shaped wire, rings, etc.

Write for folder describing and illustrating the many novel features of this new line of spring making equipment. Send us sample springs or drawings. Your spring problems will be welcomed.

THE TORRINGTON MANUFACTURING CO.

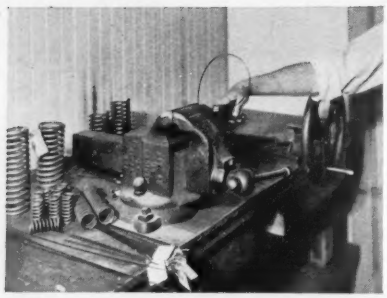


Fig. 16. Showing the remarkable bending qualities of a piece of electrically treated wire with a hardness of Rockwell C-65. ✦ ✦

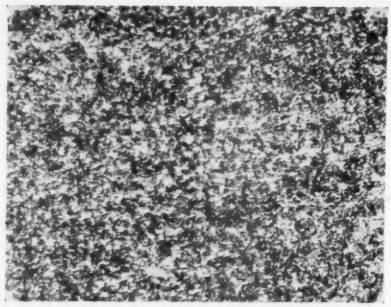


Fig. 17. Microphotograph X2000 illustrating the structure of wire hardened by the resistance method and drawn to a hardness of Rockwell C-45-47. ✦ ✦ ✦ ✦

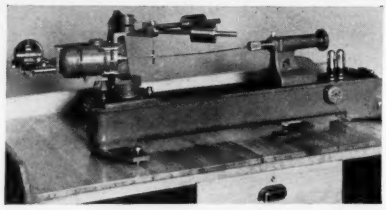


Fig. 18. The high speed reversed flexure fatigue testing machine used to compare the fatigue properties of electrically treated wire with oil tempered wire. ✦ ✦ ✦

speed of the wire passing into it or by raising or lowering the temperature of the "alloy". The greatest tendency to enter the precipitation zones lies in two sections of the curve, in the vicinity of 1000°F., and again below 250°F. A very rapid quench is necessary to avoid the danger zone at around 1000°F. The combined "alloy"-oil quench used in the resistance process accomplishes this by quenching rapidly from the quenching temperature of about 425° F. in the alloy, and then tapering off to the martensite transformation range in the oil quench. The physical stresses set up by the rapid quench from the quenching temperature to 425° F. are relieved before the martensite precipitation takes place in the oil. This rapid quench rate depresses the temperature of martensite precipitation and entirely prevents the formation of fine pearlite in the 1000° F. range. This insures a fully martensitic and unusually fine grained structure in the hardened condition. The rate of austenite formation is increased by the fast heating rate of electric direct resistance heating.

✦ ✦ ✦

Toughness of the Electrically Treated Product

FIGURE 16 illustrates the remarkable bending qualities of a piece of electrically treated wire having a hardness of Rockwell C-65.

✦ ✦ ✦

THE fact that this wire can be bent into a four-inch loop gives an indication of its toughness. There is no surface decarburization on the electrically treated wire and no artificial atmospheres are used in the heating cycle. Figure 17 shows a typical structure of an electrically hardened and tempered wire having a hardness Rockwell C-45-47. Note the extremely fine grain and the fine dispersion of the carbides throughout the structure.

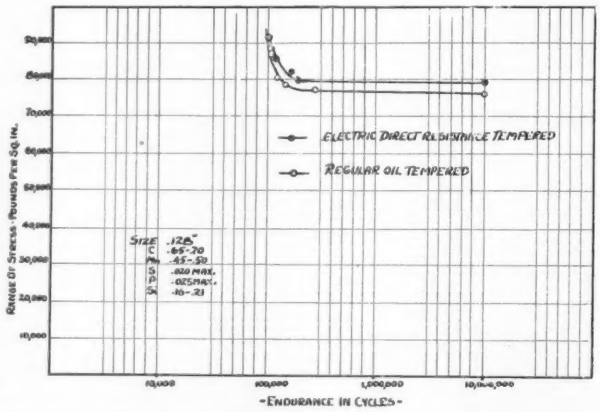


Fig. 19. Curve comparing reversed flexure fatigue characteristics of electrically tempered wire with oil tempered wire. ✦ ✦ ✦

✦ ✦ ✦

Fatigue and Physical Properties

FATIGUE tests were made to compare the fatigue properties of electrically treated wire with the same wire oil tempered. The machine used for these tests was of the reversed flexure, constant strain type and is illustrated in figure 18. It is capable of speeds up to 15,000 R. P. M. and is fitted with a vernier attachment for reading the angle of flexure to compute the stress applied to the wire. The fatigue limits as depicted on the curve (figure 19) were determined by running a series of tests at different stresses. To make the tests a high grade Swedish steel wire was selected having the analysis shown in Table A.

✦ ✦ ✦

ONE half of the bundle was tempered by the electric direct resistance method and the other half by the regular oil tempering method. Care was taken in the selection of specimen as to surface conditions. Referring to the curve (figure 19) the tests were begun with an applied stress of 91,500 lbs. per square inch. The stress was gradually reduced until the specimens ran 10,000,000 cycles without breaking. The endurance limits of the electrically treated wire were consistently higher for given stresses than those for the oil tempered wire. At a stress of 79,000 lbs. per square inch, the oil tempered wire broke in 259,000 cycles while the electrically tempered wire ran indefinitely. It was

TABLE A

C	Mn	S	P	Si
.65-.70	.45-.50	.020 Max.	.025 Max.	.16-.21

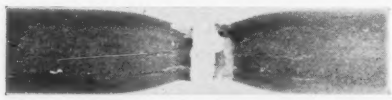


Fig. 21. Fractured tensile specimen of wire treated by the Electric Direct Resistance method. ✦

interesting to note that the fatigue limit of the electrically treated wire was about 3,000 lbs. per square inch higher than that of the oil tempered wire.

✦ ✦ ✦

THE table in figure 20 compares the physical properties of electrically treated wire with regular oil tempered wire of the same analysis. Note the exceptionally high physical properties of the electrically tempered wire, especially the high elastic limit and the large reduction in area.

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Summary:

1. Wire heat treated by the Direct Electric Resistance process possesses higher physical and fatigue properties than wire treated by the usual oil tempering method.

2. With direct electric resistance heating a finer grain is produced than is possible by any other method.

3. There is no surface decarburization and the wire has an excellent finish.

4. Much greater wire speeds are possible than those used in conventional methods.

5. A wire tempering unit can be converted to a patenting or annealing unit in a few hours time.

6. The heating and quenching cycles can be accurately controlled.

FIGURE 20

TABLE COMPARING PHYSICAL PROPERTIES OF ELECTRICALLY TREATED WIRE WITH OIL TEMPERED WIRE OF THE SAME ANALYSIS

	Analysis						
	% C .65-.70		% Mn .45-.50	% S .020 Max.	% P .025 Max.		% Si .16-.21
	Size	Elastic Limit (Johnson's)	Yield Point .2%	P. S. I. Tensile Strength	% Elongation in 2 Inches	% Reduction In Area	Rockwell C
Elect. Tempered	.128	214,000	222,000	234,000	9.0	60.0	45-47
Oil Tempered	.128	175,000	186,500	218,000	9.0	53.0	45-47

The photograph (figure 21) shows the fracture of a tensile test specimen of electrically treated wire. Note the large reduction, and the interlacing, cup-type fracture.

Electric Instrument Springs

By C. D. Wagoner,
General Electric Co., Schenectady, N. Y.

WIRE but three thousandths of an inch in diameter, smaller than the hair from one's head, is flattened between powerful polished rollers and made into delicate springs for light or exposure meters such as used by photographers; wire three times as small, so fine the human eye can scarcely see it, is smoothly wound into tiny aircraft instrument coils of a definite and exact number of turns; instrument pivots are made with points sharper than the most perfect needle. All this is done in the meter and instrument laboratory and workshop of General Electric in its West Lynn plant, as part of the daily routine which turns out 4,000 or more meters and small measuring instruments per day.

✦ ✦ ✦

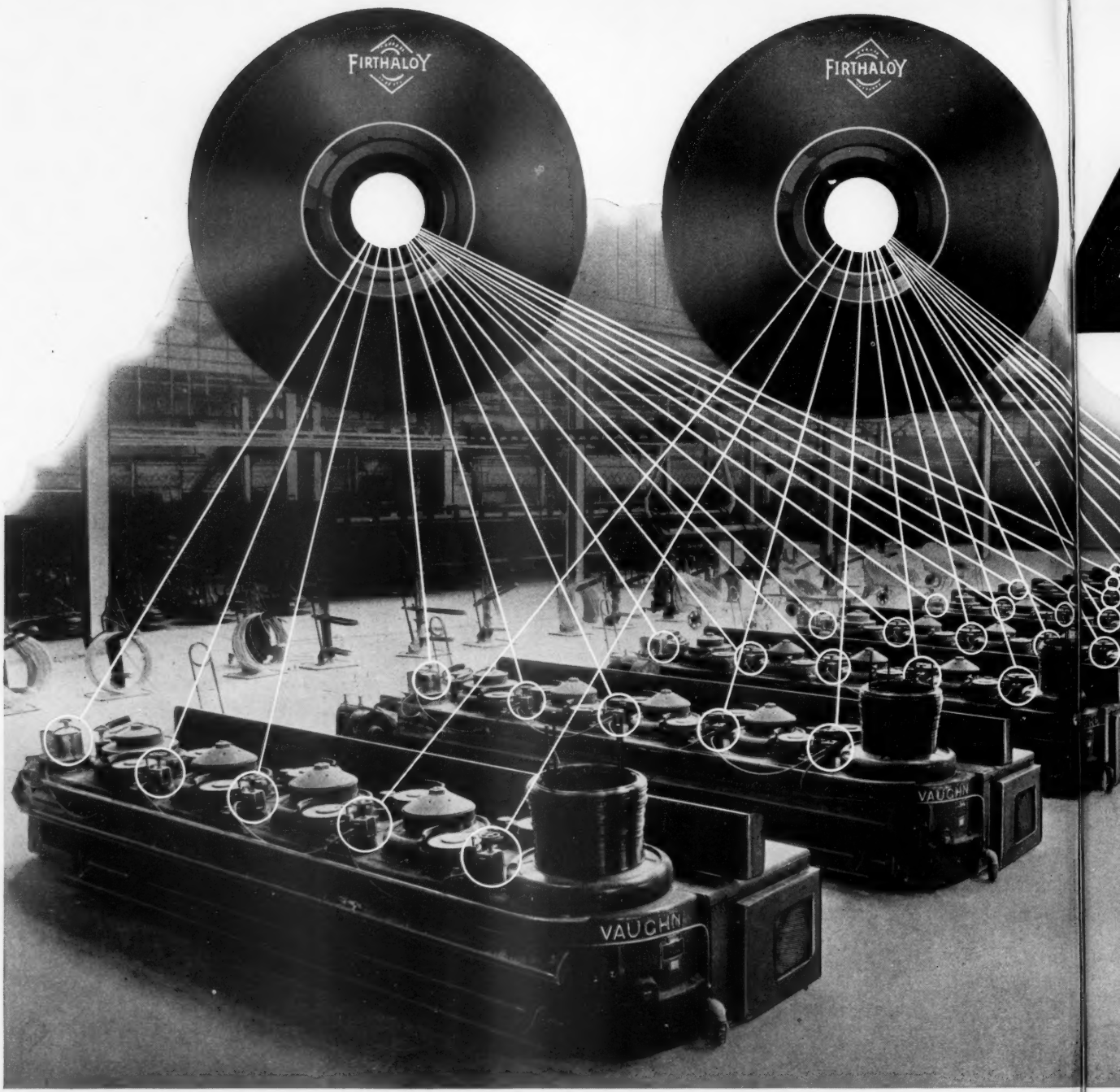
FOR each type of electric instrument, the engineering staff specifies a spring of definite dimensions: length, breadth, thickness. The ratio of these dimensions is very critical; for the most satisfactory operation of the instrument, the ratio of length to thickness must be more than 2500 to one. Also, the exact thickness of the spring ribbon is very important because the torque exerted by the finished spring varies directly with the cube of the ribbon thickness. Doubling the thickness would increase the torque eight times. Tweezers and microscopes are also used in the manufacture of these tiny springs. Bronze wire but three thousandths of an inch diameter is passed through highly polished and powerful rollers and flattened to a uniform thickness of nine ten-thousands of an inch, and one hundredth of an inch wide. These delicate strips, far thinner than human hair, are cut to size, wound into tiny spirals and then placed in an electric furnace. They emerge clean and bright with the exact mechanical rigidity they must maintain throughout their long use.

Springs for G-E Instruments being inspected and checked in G-E West Lynn Works. ✦

✦ ✦ ✦

AN operator, armed with tweezers, lifts each palpitating spring, slips it on a torsion-measuring device, and measures the force it will exert. Unerringly, this device detects differences in spring

(*Please turn to Page 796*)



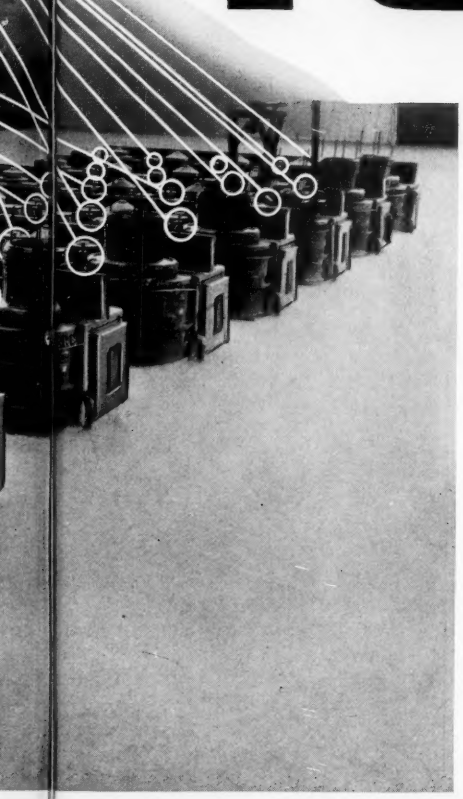
FIRTHALOY PRODUCTS

Wire Drawing Dies — Tube Drawing Dies
Extrusion Dies — Special Shape Dies
Wire Guides — Spring Wire Applications
Arbors or Mandrels — Wear Resistant Parts, etc.

FIRTH-ST

STEEL CO

40 FIRTHALOY DIES GIVE THIS BATTERY OF MODERN MACHINES THE UTMOST IN WIRE DRAWING EFFICIENCY



Today, increased production costs make plant modernization more important than ever. The higher speeds obtained with modern wire drawing machines require carbide dies to effect maximum savings. Longer die life at higher speeds results not only in lower die costs, but contributes substantially to the economical operation of these modern drawing units through increased production, reduction in die set-up time, fewer rejections, and more uniformity in wire sizes on all runs. Many large mills realizing these factors have included FIRTHALOY Dies in their modernization program because they have found that FIRTHALOY Dies meet every requirement. They also obtain additional economies by extending this modernization program to include their die recutting shop and find FIRTHALOY Die Machinery the most efficient.

FIRTHALOY Dies and Die recutting machinery are the answer to complete modernization.

STERLING
COMPANY

Works: McKEESPORT, PA.
NEW YORK CHICAGO HARTFORD
CLEVELAND DETROIT LOS ANGELES
PHILADELPHIA DAYTON
GLOBE WIRE DIVISION, McKEESPORT, PA.

Wire Association Technical Meetings

A review of the discussions at the technical meetings of the Wire Association at Atlantic City, N. J., October, 1937. ✦

IT was the unanimous opinion of the presiding officers of the different technical sessions held at the annual Convention of the Wire Association in Atlantic City in October, that this year's meetings surpassed all previous meetings, both in type of papers presented and information obtained through the resulting discussions.

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THE one criticism made was "lack of time". Each chairman reported that in order to make way for the paper following and the fact that the discussion had to be terminated within the set time really left a great deal unsaid on every paper presented.

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THE opening technical session on Monday afternoon consisted of a presentation of a lecture by A. F. Anjeskey, Sales Manager, Cleveland Tramrail Division, Cleveland Crane and Engineering Company, Wickliffe, O., on **"New Developments in Material Handling for Wire Mills".**

✦ ✦ ✦

THE discussion developed into a wide open session on operating problems, perhaps more so than at any other meeting of the Convention. Labor costs and the number of men engaged in the operating processes from the rod storage to the wire machines was subjected to discussion with coinciding and differing opinions of executives of various companies.

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THE labor cost per ton of cleaning rods, including the foreman's time was given as 11 man minutes and this was reported as representative for wire plants. It was also brought out that an investment of $11,000 is necessary in a wire mill before a single man can be employed, but that the release of a single man for other duties is equivalent to $6,000 in new equipment.

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MATERIAL handling systems were excellently and completely covered by illustrated lantern slides and discussions regarding the relative merits of the straight line cleaning system versus the circular ring operating cycle were most interesting. Different types of approach for cleaning in relation to labor costs and handling were discussed, such as continuous single strand cleaning for rods and wire similar to continuous galvanizing operations instead of the single load or batch cleaning; continuous cleaning of rods and wire of individual coils that was performed and later discontinued after a comparatively few years of operations by a large motor car manufacturer, etc. The consensus of opinion was that batch cleaning, as now performed, is the best method in use today.

Some British visitors—John Rigby, Harold Rigby and W. Lewis, of John Rigby & Sons, Ltd., Low Moor, Manchester, England. ✦ ✦

✦ ✦ ✦

THE limitation of loads practical to process through wire mills was another question discussed at this session. Due to the present day construction of steel manufacturing plants in relationship to material handling as well as their customers ability to handle rods or wire, 4500 lbs. net was given as the present day limit of a batch load of rods or wire. Opinions were also presented that single coils of 2,000 or 3,000 lbs. would be feasible on wholly new construction under modern material handling methods, but no limit was given to the batch load because that would entirely depend on the strength of construction of a plant to sufficiently handle such loads through process.

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AMONG other things, Mr. Anjeskey discussed a newly developed nozzle which is designed to produce a fan-like spray and which by proper arrangement in the tank will clean every square inch of wire. Methods of construction of tanks were also discussed as well as methods of emptying dilute acid after cleaning the loads.

✦ ✦ ✦

IN the opening session Tuesday morning, Mr. Allan B. Dove, Chemical Engineer, Canada Works, Steel Company of Canada, Ltd., Hamilton, Ontario, Canada, presented a paper on **"A. C. Electro-Pickling"**, which received honorable mention for the year. Mr. Dove presented

data and graphs from recent comparative tests of various methods of electro-pickling to illustrate that the pickling efficiency, speed, costs and low iron losses are definite results of this A. C. method of electro-pickling.

✦ ✦ ✦

MR. H. C. Klein, Engineer, B. F. Goodrich Company, Akron, Ohio, presented his paper entitled **"Handling Waste Acids from Pickling Operations"**. The paper was devoted primarily to the disposal of the acid rather than to the construction of the tanks. The resulting discussion brought out comparative opinions as to pickling tank construction, drains, methods of cleaning, and the disposal of waste acids.

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BECAUSE of the limitation of time, this discussion was terminated in the morning to make way for the paper to follow, but after the formal meeting in the afternoon, an informal meeting was called to discuss the new ways and means of meeting new legislation in the various states on the disposal of waste acid. It was the consensus of opinion at this meeting that it would not pay to regenerate or to manufacture a by-product of ferrous-sulphate. All in attendance at this meeting agreed that it was more economical to dispose of the waste acid by the cheapest method available and not try to reclaim it.

✦ ✦ ✦

THE paper **"Lime in the Wire Industry"** by D. E. Washburn, Chief Chemist, American Lime & Stone Company, Bellefonte, Pa., at this session was devoted to the characteristics of the several grades of lime required by the wire industry. Mr. Washburn warned that the magnesia content of high calcium lime should not be under 1% and not over 2% for the wire mill. If the maximum percentage is exceeded, he stated that the product would lack adhesiveness. It was further brought out by Mr. B. L. McCarthy, Chief Metallurgist, The Wickwire Spencer Steel Company, Buffalo, N. Y., that it is desirable to have a fluffy lime coat on the wire as it reaches the baker as this seems to be the best vehicle for preventing the breaking down of the soap lubricant during the drawing operation.

✦ ✦ ✦

ON Tuesday afternoon, two papers were presented; the first **"A Metallurgical Study of the Factors Affecting the Quality of Galvanizing"** by R. W. Sandelin, Chief Metallurgist, Atlantic Steel Company, Atlanta, Ga., and the second a paper entitled **"Fatigue Properties of Helical Springs"** by R. R. Tatnall, Engineer, Morgan Works, Wickwire Spencer Steel Company, Worcester, Mass.

✦ ✦ ✦

MR. Sandelin's paper received first Honorable Mention for the year and was a study of galvanizing defects as affected by the nature of the steel base. There was a very interesting discussion as to the causes of "spotting" details of which will be found in the annual Proceedings.

✦ ✦ ✦

MR. Tatnall's paper was a discussion of certain experimental work relating to helical compression and extension springs of round wire section with consideration being given to springs made of the common type of carbon steel wires. An interesting discussion bringing out many points of general interest to both wire manufacturers and spring makers resulted.

✦ ✦ ✦

ON Wednesday there were joint sessions of the ferrous and non-ferrous divisions, held simultaneously.

✦ ✦ ✦

THE ferrous sessions in the morning were devoted to cold heading problems and papers were presented by L. S. Cooch, Metallurgist, Buffalo Bolt Company, North Tonawanda, N. Y., entitled **"Thermal Treatment of Rods and Bolts"** and by A. R. Ryan, Industrial Heating Engineer, General Electric Company, Schenectady, N. Y., entitled **"Developments in Cold Heading at General Electric"**.

✦ ✦ ✦

THE consensus of opinion was that the subject of the paper presented by Mr. Cooch was of vital interest to all wire production men as well as to all manufacturers of bolts, nuts, screws, and rivets, and that if possible more time be devoted next year to discussion on this subject.

✦ ✦ ✦

MR. Ryan in presenting his paper outlined some future plans of his company in cold heading operation, including the use of heavier coils to feed the cold heading machine, the possibility of using tungsten carbide cold heading dies, and the addition of wire drawing equipment ahead of some of the cold heading machines permitting the use of hot rolled wire and its accurate drawing just before it enters the header.

✦ ✦ ✦

IN the afternoon ferrous session, the paper entitled **"Abnormal Grain Growth and the Annealing of Low Carbon Steel Wire"** by B. L. McCarthy, Chief Metallurgist, Wickwire Spencer Steel Co., Buffalo, N. Y., was presented, followed by a discussion on "The Flash

(*Please turn to Page 792*)

✦ ✦ **Firth-Sterling Steel Co.** ✦ ✦
Exhibiting Firthite tools, Firth-Sterling stainless steel, tool steels, die steels, Firthaloy wire drawing dies, tube drawing dies, etc. ✦ ✦

Wire Association Questions and Answers

Question 4209

"We are seeking definite data as to the pull required for reducing in a Draw Bench tubing made from 18-8 stainless steel. There is some question as to whether the drawing of stainless steel follows the formula generally used for pulling material in a Draw Bench.

We would like general data for reference although at the moment the specific problem we have in hand is to use a Draw Bench for reducing this tubing from 1½" OD having a No. 12 (.109) Stubbs gauge wall. We want to make a 30% reduction in area per draft.

If you have any references which would be of value in this matter, we shall appreciate very much hearing from you."

✦ ✦ ✦

Answer No. 1

"AS far as the bench is concerned, the same type is used for drawing 18-8 as for ordinary carbon steel tubing.

With stainless steel on a draw operation, naturally the drafts have to be light. In making a 45% reduction in area, three passes are usually taken. If a 30% reduction is taken, either the point of the tube breaks or the mandrel will readily wear.

We feel that two very important factors in drawing stainless tubing are heat treating and lubrication. On sinking stainless steel tubes without a mandrel, a 30% reduction might be taken.

We trust that our experience throws some light on the questions your member may have in mind."

✦ ✦ ✦

Query on Above Reply

"THE next to the last paragraph is not entirely clear to me. Do you mean in that paragraph that the thirty percent reduction applies to area or does it really mean reduction in diameter? I should think, inasmuch as this paragraph refers to drawing without a mandrel, that you must have had in mind reduction in diameter and not reduction in area.

I am reluctant to annoy you with this matter, but I should appreciate very much having your comment as to the proper interpretation of the paragraph in question."

✦ ✦ ✦

Answer to Query

"IN reply to your inquiry, the next to the last paragraph of our letter refers to reduction in area. Inasmuch as this is a sinking operation, you can take more reduction than you could take in reducing stainless steel over a mandrel."

✦ ✦ ✦

Answer No. 2

"IN reply to your inquiry, the following information may be of interest: It makes a big difference whether they mean 30% of 1½" O. D. or 30% of wall (.109").

The Wire Association is for the specific purpose of improving production methods. It was organized as a clearing house of ideas on technical problems and research work in all phases of practical wire drawing and wire working.

The inquiries discussed were received from and answered by members of the Wire Association. These inquiries are sent to the Secretary of the Association who acts as a central clearing point, and neither the names of the firms or individuals sending in the inquiry, or of the men or firms replying are divulged without permission.

My experience indicates that they could sink 30% all right, but could not pinch that much at the same draft.

They should figure on sinking ⅛" and pinching 1 gauge, at least that is what I would do on a tube as thin as .109".

✦ ✦ ✦

Question 4210

"I have had a problem during the past few months which does not seem to be clearing up as well as I would like and possibly I could obtain some help through your publications or through some member of the Association.

This particular problem refers to the property of medium hard drawn copper wire, used in the manufacture of weatherproof wire. We have on numerous occasions received complaints from customers stating that our medium hard drawn copper wire is very brittle and hard to handle and more like hard drawn copper than medium hard drawn. We have obtained samples from these customers and carried out elongation and tensile strength tests in accordance with the ASTM specifications. We have yet to find one case where the elongation and the tensile strength of the copper was outside the limits of medium hard drawn wire. As a matter of fact the majority of the results showed that the copper was close to the minimum limits of the tensile strength required for medium hard drawn wire as covered by the ASTM specifications. In other words the wire should have been less brittle and softer than the average run of medium hard drawn copper wire.

I am wondering whether you, or any member of the Association might know of any test which would show brittle copper or stiff copper and yet not have the results shown in the elongation and tensile strength test.

We have had analysis made on the copper itself and cannot note any peculiar properties in the structure of the copper."

✦ ✦ ✦

Answer No. 1

"SUGGEST the use of a Bend Tester developed by the General Electric Company, Schenectady, N. Y."

Answer No. 2

"ANSWERING inquiry from one of the members of the Wire Association, would advise that the only test we know of that would show up embrittlement is the reversed twist test.

If your member will send us some samples of the wire we will be glad to make this test for him."

✦ ✦ ✦

Answer No. 3

"I HAVE noted the inquiry submitted with your letter. You might tell this party seeking information to try out Oxygen-Free Copper. If this does not work, I am quite sure if the matter is taken in hand with the Technical Department of Kennecott Wire and Cable Company Phillipsdale, Rhode Island, they will be glad to render any or all assistance possible."

✦ ✦ ✦

Answer No. 4

"I HAVE noted the question in connection with medium hard drawn wire and am sorry that we have never had this experience and do not know of any method of determining the relative quality of various samples of wire except by the tensile strength and elongation tests. I should think that this would give the results that they want. If it does not there is the possibility that the Morehouse test which is a springiness test, would be of some assistance.

The trouble sounds to me like impurities in the copper or improper processing."

✦ ✦ ✦

Answer No. 5

"YOUR inquiry with reference to complaint on Medium Hard Drawn wire has been referred to me for acknowledgement.

It would be impossible for us to make an intelligent statement as to the problem of the conductor as described in this inquiry unless we actually had a sample of the conductor. The complaint, in our estimation, is entirely unreasonable.

We do not have a method of testing wire for any peculiarity such as you described. If you can furnish us with a sample of this wire we may be able to offer some suggestion."

✦ ✦ ✦

Question 4211

"We are manufacturing round nails by drawing wire rod containing 0.25% C. the daily production being 120 tons. If you will kindly answer me the following questions based on the typical wire drawing practice as applied in the wire drawing mills with the special object of the production of nails in America, I will be very grateful.

Wire Association Questions and Answers

(1) What are the concentration and temperature of sulphuric acid used in pickling? Is there any inhibitor being used?

(2) Is soap or some other thing being mixed in simple lime in lime bath?

(3) What kind of lubricant is used when malleable die and alloy die are used? With the use of that lubricant kindly tell me regarding the range of speed of drawing, reduction ratio, and number of reduction (If a methodical table is available showing drawing process of each gage from rod to B.W.G. No. 17, I rather prefer it), chemical constituents of the wire drawn by above process, and the type of drawing machine (whether single hole or continuous draft type) used?"

✦ ✦ ✦

Answer No. 1

"ANSWERING your questions as they are numbered:

1. We use hot sulphuric acid at a temperature of between 180 to 200° F. and 25% acid solution. We also use an inhibitor with all acid tanks.

2. We use nothing but pure lime in our lime bath. Any soap or lubricant which is applied is used at the Wire drawing frame.

3. When using cast iron or alloy dies, we use powdered soap as a lubricant. The average speed of the various finishing blocks is as follows:

26" Block—300' per minute
22" Block—320' per minute
16" Block—430' per minute

The standard American practice for drawing from No. 5 rod, gauging decimally .207, down to No. 17 finished wire, .054" is as follows:

First draft .160"
Second draft .125"
Third draft .100"
Fourth draft .080"
Fifth draft .065"
Sixth draft .054"

The chemical analysis of standard nail wire rod in this Country is as follows:

Carbon .08 to .15
Manganese .40 to .60
Phosphorous .025 to .035
Sulphuric .045 to .075

Both Continuous Machines and Single Hole Machines are used in this Country for producing the above types of wire."

✦ ✦ ✦

Question No. 4212

"We would appreciate receiving from you such information as is available on Resistance Annealing of Low Carbon Wire.

In this connection we might say that we were particularly interested in the annealing of wire at .036" or .032" gauge and would like to know if it is possible to quench the heated wire and achieve a structure suitable for drawing to finer sizes."

The Wire Association is for the specific purpose of improving production methods. It was organized as a clearing house of ideas on technical problems and research work in all phases of practical wire drawing and wire working.

The inquiries discussed were received from and answered by members of the Wire Association. These inquiries are sent to the Secretary of the Association who acts as a central clearing point, and neither the names of the firms or individuals sending in the inquiry, or of the men or firms replying are divulged without permission.

Answer No. 1

"RE your inquiry on resistance annealing of low carbon wire. The subject has come up from time to time and has been investigated by different companies, always with the result that it has been abandoned because of the excessive cost and extreme difficulty in making suitable electric contacts to insure uniform annealing. This method has been successfully applied by a Cleveland firm interested in high carbon wire where the wire is drawn very accurately to size and where the excessive cost is warranted due to the particular structure required.

This type of annealing is not at all suitable for wire that is going to be extensively re-drawn, since wire of the sizes that you mention require considerable time and heat regardless of the method of applying heat. I happen to have photo-micrographs showing the response to heat over intervals of five minutes of low carbon steel wire, size .031. The minimum time required for complete annealing when single strands are subjected to heat is twenty minutes, which means that the rate of travel of a single strand must be exceedingly slow or that the path of travel must be exceedingly long, or both.

The best method of annealing low carbon wire of the sizes you mention where a uniform anneal is required for re-drawing purposes is the pit type of furnace. Improper design of such furnaces has thrown them into bad repute, but intelligent re-design has caused them to come back into general use in the plants of most of the important wire producers in this country. I have been associated with the development of a particular type of pit furnace which I can unhesitatingly recommend to you for your particular application. This unit is built by the Electric Furnace Company of Salem, Ohio and you have doubtless seen it advertised on the back covers of the current issues of "Wire & Wire Products"."

✦ ✦ ✦

Question No. 4213

"The standard diameter tolerances for round bright wire in coils are as follows:

Steel Wire Gauge	Tolerance— Plus or Minus
½" or coarser	0.003"
Finer than ½" to 14½	0.002"
14½ (.076") to 20	0.001"

I am interested in knowing what the corresponding standard (or generally accepted reasonable) out-of-round tolerances are for the above set-up and would appreciate it if you would secure these figures for me from the Wire Association membership."

✦ ✦ ✦

Answer No. 1

"IN reply to your inquiry regarding permissible out-of-round, we do not believe there are any set rules concerning this, but the maximum out-of-round condition that we try to follow is as follows:

Diameter Tolerance	Maximum Out-of-round
plus or minus .003"	.0015"
plus or minus .002"	.001"
plus or minus .001"	.0005"

✦ ✦ ✦

Answer No. 2

"IN regard to your letter concerning an inquiry from one of the Wire Association members on standard diameter tolerances for round bright wire in coils.

Generally we have accepted the regular mill tolerance on all sizes of wire. However, our practice has been to find the particular customer's wishes and abide by that entirely for when it's all done and said, it's the customer that must be satisfied regardless of general mill practice".

✦ ✦ ✦

Answer No. 3

"OUR comments on the inquiry regarding the standard out of round tolerance for steel wire are that there no such standard has ever been established, due to the fact that with the close drawing tolerances, the out of round factor is practically nil; especially so since the use of Tungsten Carbide Dies.

However, we have had occasion to question this matter at various times and some operating steel men have advised that this factor of out of round should not exceed 50% of the total drawing tolerance.

We trust that this information will be of some help to the member making the inquiry."

✦ ✦ ✦

Answer No. 4

"ANSWERING your inquiry, would advise that in drawing hot rolled rods into wire for the manufacture of our bolts we work to the plus or minus tolerances mentioned in your letter."

Outstanding Personalities of the Wire Industry

N. C. Harrison, Vice President and General Superintendent of Operations, Atlantic Steel Company

MR. N. C. Harrison, Vice President and General Superintendent, in charge of operations of Atlantic Steel Company, was born in Petersburg, Virginia, where he received his elementary instruction. Graduating as a Mechanical Engineer from Lehigh University in 1905, he entered the employ of Cambria Steel Company, serving as Inspector of Finished Material, Chief Inspector of Finished Material,, Roll Shop Draftsman, and Foreman of Rolling Mills.

✦ ✦ ✦

FROM 1908 to 1910 he was employed by Carnegie Steel Company as Foreman of Rolling Mills Billet Yard and Assistant Steam and Hydraulic Engineer and from 1910 to 1912 he was Assistant Steam and Hydraulic Engineer for the National Tube Company. From 1913 through 1914 he was with Pittsburgh Crucible Steel Company in charge of the designing of all steam, water, air and gas pumping stations and as Superintendent of their Morgan Merchant Mill.

✦ ✦ ✦

COMING with Atlantic Steel Company in January, 1915 as Chief Engineer, Mr. Harrison was promoted to General Superintendent in April, 1916.

✦ ✦ ✦

HE is a member of the American Society of Testing Materials, the American Society of Mechanical Engineers and a Director of the Wire Association, and is active in religious, civic and social circles.

✦ ✦ ✦

J. H. Robinson, Vice President, Charge Sales, Wheeling Corrugating Company

MR. J. H. Robinson was elected Vice-President in charge of sales of the Wheeling Corrugating Company at a meeting of the Board of Directors held on September 27th at the general offices of the company as Wheeling.

N. C. HARRISON
Vice President and General Superintendent of Operations.
Atlantic Steel Co., Atlanta, Ga.

MR. Robinson has long been associated with the Wheeling Corrugating Company, having started in the billing department in January, 1899. In 1906 he went to Detroit as a salesman and in 1907 opened the Detroit sales office. In 1911 he was transferred to the St. Louis territory as assistant manager and became manager of that office in 1923. He returned to Wheeling in 1931 as Secretary of the Wheeling Corrugating Company and has held that position until the present promotion.

✦ ✦ ✦

John May, Vice President In Charge of Sales, American Steel and Wire Company

JOHN May has been elected Vice President in charge of sales of the American Steel & Wire Co., subsidiary of the United States Steel Corpn., according to an announcement by C. F. Blackmer, President of the Wire Company. Mr. May succeeds Dennis A. Merriman, who is retiring.

MR. May's service with the company dates back to February, 1909, when he was employed as a Correspondent in the Order Department at the New York office of American Steel & Wire. In May of the same year he was transferred to Worcester, Mass., as Assistant to the Educational Director of the company and in October returned to the New York office as Correspondent in the Electrical and Wire Rope Sales.

✦ ✦ ✦

IN May, 1910, he was made a Salesman in the Electrical and Wire Rope Sales division, which position he retained until being made Assistant Manager of Sales in that division in January, 1918. He was appointed Manager of Electrical and Wire Rope Sales in February, 1922, and in March, 1931, was made Assistant General Manager of Sales of the American Steel & Wire Co. Mr. May was appointed to the position of General Manager of Sales in March of this year.

✦ ✦ ✦

BORN in Rockland, Me., Mr. May received his grammar and high school education in that city. He was graduated from the University of Maine with an engineering degree in 1905. He was employed in the Engineering department of the New York Telephone Co. for three years after his graduation from college before becoming associated with American Steel & Wire.

✦ ✦ ✦

C. F. Stapleton, With Republic Steel Corp.

C. F. Stapleton, identified with the sale of wire products since 1909, is now associated with Republic Steel Corporation. His appointment as a representative for the west coast was recently announced by J. P. Distler, Manager of Sales, Wire Division.

✦ ✦ ✦

MR. Stapleton entered the wire selling field with the Pittsburgh Steel Co., in 1909. He transferred, in 1915, to the Keystone Steel & Wire Co., as manager of the

Outstanding Personalities of the Wire Industry

Indiana territory. Later, his work was expanded to include Ohio and Michigan. In 1930, he was appointed Pacific Coast Manager, a position he retained until his new connection with Republic Steel Corporation. Mr. Stapleton's headquarters will be at the San Francisco District Sales Office of Republic.

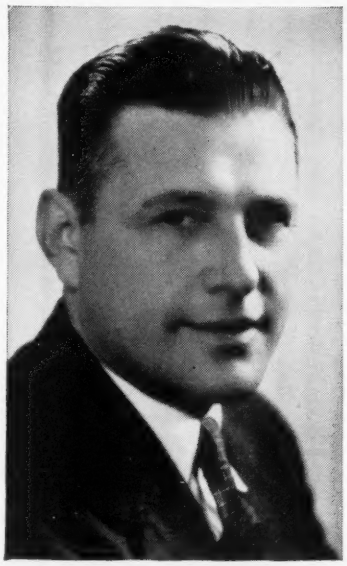
✦ ✦ ✦

Schraub Appointed Sales Manager Union Wire Rope Corporation

LESTER G. Schraub, for the past nine years manager of sales for the Wire Division of the Sheffield Steel Corporation, Kansas City, has accepted the appointment as general sales manager of the Union Wire Rope Corporation, of Kansas City, and entered upon his new duties October 15th. His headquarters will be at the company's general offices, 21st and Manchester, Kansas City. The Union product is distributed throughout the wire rope using industries of the United States, as well as in Canada, Mexico, South America and the Orient. Mr. Schraub will head a sales and distributing organization which blankets the United States, with special divisions to cover the petroleum and logging industries, and which reaches foreign countries through a special representative in Mexico and through the Lucey Export Corporation of New York, which operates throughout the world.

✦ ✦ ✦

MR. Schraub brings to his new task a background of 23 years experience in the steel and wire business. He served for 14 years with the Keystone Steel & Wire Company, of Peoria, Illinois, reaching the position of assistant sales manager, prior to assuming charge of wire division sales for the Sheffield Steel Corporation. The only interruption in his career in the steel and wire industry occurred during the World War, when he was in the United States Army and saw 13 months of service in France. He is a native of Illinois.



LESTER G. SCHRAUB
Union Wire Rope Corp.

Frank H. Sleeper, President, Sleeper & Hartley, Inc., Died Recently

FRANK H. Sleeper, 74, noted inventor of spring making machinery, and President of Sleeper & Hartley, Inc., Worcester, Mass., designers and builders of high speed automatic spring and wire working machinery, died Thursday, November 4, 1937 in St. Petersburg, Florida, after a short illness.

FRANK H. SLEEPER
President, Sleeper & Hartley, Inc.

BORN November 26, 1862, at Coaticook, Quebec, Canada, Mr. Sleeper's inventive genius developed early in life, when at the age of 17 he built his first very practical wire machine. At 22 he designed and had patented a ball bearing lifting jack still being manufactured and sold by a leading lifting jack manufacturer in United States and Canada.

✦ ✦ ✦

UNTIL 1905 he designed and built many wire working machines for the wire companies of Canada, subsequently the Morgan Spring Company of Worcester, Mass., became interested in his ability, and as a result he was induced to move to Worcester to design special machinery for them. In this capacity, he developed a number of spring making machines. At the end of a five year contract, he went into business for himself in 1911, designing and building wire forming machinery for the general trade. As his machines were the first to eliminate all hand operations, the spring industry was revolutionized.

✦ ✦ ✦

IN 1913, business having developed so rapidly that he was no longer able to handle it without help, Mr. George D. Hartley was taken into the business as Office Manager. He served in this capacity and also as Secretary and Treasurer until May, 1936, at which time his interest was purchased by the firm at an extremely fair price.

✦ ✦ ✦

MR. Sleeper's genius and great inventive ability is established by the fact that during his life he took out over three hundred different patents, the last one being granted only two months prior to his death. During the past few years, he had not been as active in the business as formerly, spending the Winter months at his home in St. Petersburg, Florida and the Summers at Lake Massawippi, Ayers Cliff, Quebec, Canada.

(*Please turn to Page 788*)

Exports and Imports of Wire

Exports of Iron and Steel Wire Products in Sept. 1937 and Sept. 1936
(In Gross Tons)

	Sept. 1937	Aug. 1937	Sept. 1936
Wire rods	7,571	7,858	1,541
Strip steel	10,811	7,703	4,942
Plain, black or galvanized iron or steel wire	3,091	6,698	3,935
Barbed wire and woven wire fencing	2,563	4,092	3,739
Woven wire screen cloth	80	101	117
Wire rope	694	1,119	.....
Insulated iron or steel wire and cable—see analysis below			
Other wire and manufactures	673	748	280
Wire nails	968	398	642
Tacks	35	37	24
Other nails, including staples	288	261	168
Bolts, machine screws, nuts, rivets and washers	1,065	731	639
Total, these 11 classifications	27,839	29,746	16,027

Imports of Iron and Steel Wire Into the United States
(In Gross Tons)

Concrete reinforcement bars	149	58	178
Hollow bar and drill steel	105	238	253
Wire rods	1,658	1,475	1,607
Barbed wire	1,624	1,781	733
Round iron and steel wire	345	493	449
Telephone and telegraph wire	.....	4	1
Flat wire and strip steel	371	307	232
Wire rope and strand	320	237	182
Other wire	146	79	346
Hoops and bands	932	1,784	2,156
Nails, tacks and staples	321	1,368	1,440
Bolts, nuts and rivets	10	109	27
Total, these 12 classifications	5,981	7,933	7,604

EXPORTS OF INSULATED WIRE AND CABLE, SEPTEMBER, 1937

	Foreign		To U. S. Possessions	
	Pounds	Dollars	Pounds	Dollars
Insulated iron or steel wire and cable	56,015	$ 9,726	61	$ 13
Rubber-covered wire	669,701	190,035	98,741	23,518
Copper weatherproof wire	292,469	46,796	41,085	8,317
Copper telephone cable	28,575	13,373	1,440	814
Other insulated copper wire	238,132	65,863	61,785	17,998
Nickel-chrome electric resistance wire	30,153	41,285	10	16
Total, these 6 classifications	1,315,045	$367,078	203,122	$50,676

Pig Iron and Plate Outstanding Products Shipped

PIG iron continued to be the leading product shipped on a tonnage basis in September its total of 64,945 tons comparing with 114,035 tons in the previous month and only 321 tons in the corresponding one of 1936. The countries of destination were mainly Japan (25,993), the United Kingdom (25,453), and Germany (3,000). Next in importance, plate (boiler, unfabricated, and fabricated) was shipped to a total of 43,200 tons (55,034 tons; 5,493 tons) in a very widespread trade, the outstanding markets being Japan (12,115), Kwantung (8,848), Canada (5,375), and Sweden (4,086). Next were black steel sheets whose trade of 28,185 tons (28,075 tons; 10,199 tons) was distributed among numerous markets of which the most prominent ones were Canada (7,010), Soviet Union (5,943), Mexico (2,253), Australia (2,104), Japan (2,092), and Brazil (1,182). Tin plate ranked fourth with 20,815 tons going to a wide range of markets (29,170 tons; 8,893 tons) those outstanding being Kwantung (2,962), China (2,447), Japan (1,997), Portugal (1,501), and Brazil (1,426).

✦ ✦ ✦

Ingots, Skelp and Steel Bars Rank High

INGOTS, blooms, etc., followed with a 20,687-ton total (69,301 tons; 1,097 tons) and for the most part went to Mexico (8,666), Japan (5,169), the United Kingdom (3,300), and British India (3,281). Canada took all of the 11,830 tons of skelp exported. Exports of structural shapes aggregated 13,640 tons (18,997 tons; 7,513 tons) and the principal outlet was Canada (5,262), other shipments ranging from 4 tons to Belgium to 947 tons to Japan. In a widespread trade of 12,190 tons (14,656 tons; 4,240 tons) steel bars represented the product next in importance, the leading markets being the United Kingdom (3,772), Canada (2,772), Japan (1,480), and the Philippine Islands (431).

✦ ✦ ✦

Japan Continues As Leading Outlet Despite Lower Purchases

JAPAN in September continued to be the leading individual market for American iron and steel products despite a decline of more than 100,000 tons from its August purchases. The outstanding products in its trade of 57,592 tons were pig iron (25,993), plate (12,702), ingots (5,169), wire rods (4,813), black steel sheets (2,092), tin plate (1,997), and rails (1,538). Canada ranked next with a trade aggregating 46,804 tons in which the principal items were skelp (11,830), black steel sheets (7,010), plate (5,402), shapes (5,262), strip steel (4,185), and pig iron (3,782). United Kingdom purchases (36,870 tons) were next in importance and for the most part were pig iron (25,473), ingots (3,300), steel bars (2,159), strip steel (1,475), and wire rods (1,400). Then came Mexico's trade of 18,791 tons made up mostly by ingots (8,666), black steel sheets (2,699), rails (1,814), and car wheels and axles (1,139). Kwantung ranked fifth with a 14,239-ton total made up of mostly plate (8,848), tin plate (2,962), and pig iron (2,000). Following were shipments to the Soviet Union which amounted to 13,638 tons and were principally black steel sheets (5,942), and plate (4,005).

✦ ✦ ✦

Far Eastern Purchases Highest

THE 102,003 tons of iron and steel products (excluding scrap) dispatched to Far Eastern markets in September made up 35.5 percent of all shipments made during the month and compared with a 50.7 percent share in August.

Next in importance were shipments to North and Central America and the West Indies (78,509 tons) which accounted for 27.3 percent of the aggregate (16.8 percent). Following was the 72,572-ton total to Europe—25.2 percent (20.9 percent). Then came shipments to South American markets (24,907 tons) which made up 8.7 percent (7.9 percent). Of least importance were exports to Africa (9,558 tons) —3.3 percent (3.7 percent).

+ + +

Pig Iron Leading Product in September

PIG iron in September resumed its leading position as the principal import item on a tonnage basis, its total of 7,911 tons comparing with 7,952 tons received in August and 15,080 tons in September 1936, and came from British India 5,740; the Netherlands, 1,506; and Canada, 465. Spiegeleisen receipts of 3,000 tons compared with 1,442 tons in August and 4,173 tons in September 1936, followed and were purchased from Canada, 2,950; and Norway, 50. Structural shapes (all plain) ranked third with a 2,537-ton total against 4,150 tons and 5,211 tons and were taken from Belgium, 2,082; and France, 378. Following was the 1,898-ton trade in ferro-manganese compared with 812 tons and 2,778 tons covered by Norway, 1,094 and Canada, 638. Fifth-ranking were solid and hollow bars totaling 1,714 tons against 2,894 tons and 4,234 tons and were imported chiefly from Belgium, 952 and Sweden, 472. Wire rods followed with an aggregate of 1,658 tons compared with 1,475 tons and 1,607 tons, coming from Sweden, 1,350 and Belgium, 249.

+ + +

Receipts From British India Highest

IMPORTS from British India during the reviewed month topped those received from any other individual country, that trade amounting to 5,740 tons and including only one semi-finished product —pig iron. Canada accounted for the next highest shipment of 5,280 tons, the outstanding items being spiegeleisen, 2,950; ferro-manganese, 638; rails, 582; and pig iron, 465. Next in importance were purchases from Belgium of 4,627 tons, consisting of mostly shapes totaling 2,082; solid and hollow bars, 952; and hoops and bands, 750. Sweden sent in the next largest total of 3,563 tons, the outstanding items being wire rods, 1,350; solid and hollow bars, 472; steel pipe, 370; flat wire and steel strips, 370; and round iron and steel wire, 287.

+ + +

CARD CLOTHING receipts amounted to 20,660 square feet valued at $27,870 against 23,534 square feet valued at $35,239 and came from the United Kingdom (18,297 square feet and $23,735), Germany (1,720 square feet and $3,136), and Belgium (643 square feet and $999).

+ + +

WIRE HEDDLE imports at 1,412,000 pieces compared

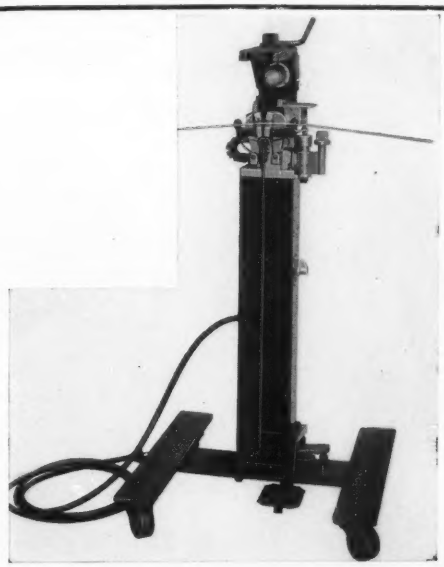
(*Please turn to Page 782*)

MICROMETER PRECISION MICRO-WELD TRADE MARK REG. U. S. PAT. OFF.

CONTINUOUS IMPROVEMENT

MICRO-WELDERS with dial indicating annealing attachments are now available for high carbon wire.

There is positive control of annealing temperature and already hundreds of these special MICRO-WELDERS are proving their dependability and satisfactory performance with leading manufacturers.



MICRO PRODUCTS COMPANY
20 NORTH WACKER DRIVE, CHICAGO, ILL.
Telephone State 7468 General Office and Factory, Peoria, Ills.

Exports and Imports

(*Continued from Page 781*)

with only 415,000 pieces in August and came from Germany (758,000), Switzerland (508,000), Austria (100,000), and France (46,000).

✦ ✦ ✦

NO trade resulted in WIRE FENCING AND NETTING of the galvanized before weaving grade against 175,857 square feet in the previous month. Of that galvanized after weaving, the total was 918,956 square feet in comparison with 2,620,952 square feet, the supplying countries being Belgium (642,368), and the Netherlands (276,588).

✦ ✦ ✦

WIRE CLOTH AND SCREEN imports aggregated 155,105 square feet (152,530 square feet in August) and were received from the Netherlands (79,442), Germany (63,208), and Canada (12,445).

✦ ✦ ✦

THE total for FOURDRINIER AND OTHER PAPER-MAKING WIRES was 38,860 square feet (50,097 square feet), this trade being covered by Austria (20,657), Germany (6,304), Sweden (6,108), and France (5,791).

✦ ✦ ✦

EXPORTS of iron and steel wood screws during September, 1937 totaled 53,755 gross valued at $7,833. Of this total Cuba took 25,870 gross valued at $4,197; Philippine Islands 14,165 gross valued at $1,441; Mexico 7,973 gross valued at $893; Dominican Republic 1,040 gross valued at $296; Colombia 897 gross valued at $207; Netherlands West Indies 812 gross valued at $236.

✦ ✦ ✦

EXPORTS of brass wood screws during the same month totaled 7,681 gross valued at $3,219. Of this total Cuba took 2,673 gross valued at $722; Canada 1,914 gross valued at $923; Netherlands West Indies 1,527 gross valued at $720; Philippine Islands 560 gross valued at $213.

IMPORTS of wood screws during the same month totaled 26,611 gross valued at $2,632. Of this total Japan supplied 13,100 gross valued at $1,023; Germany 6,490 gross valued at $669; Italy 4,701 gross valued at $373; Canada 1,530 gross valued ot $319; United Kingdom 770 gross valued at $228.

✦ ✦ ✦

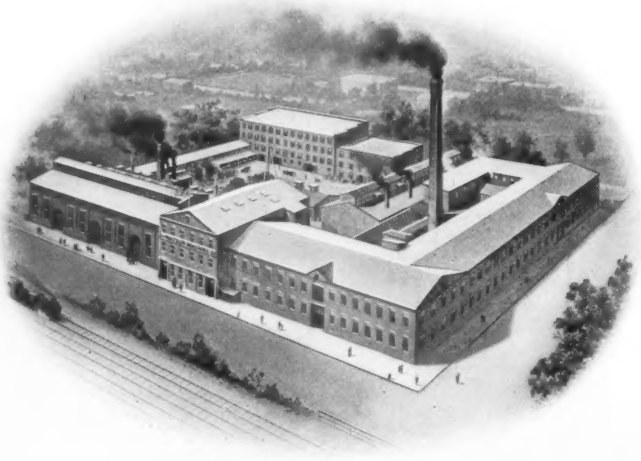
Wire, Welding Wire, and Wire Rope

IMPORTS of wire and baling wire at 2,487 tons compared with 2,654 tons in 1935, and 2,036 tons in 1934, and were supplied chiefly by Germany, the United States, and the United Kingdom. The galvanized finish (Nos. 8 to 16 gauges) continued in good demand. Japan endeavored in 1934 to become competitive in this trade, but without success. Wire rope and cable receipts aggregated 354 tons in comparison with 387 tons in 1935 and with 270 tons in 1934.

THE WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON, NEW JERSEY, U. S. A.



ENGINEERS MACHINISTS

MANUFACTURERS OF

ELECTRICAL WIRE & CABLE, WIRE ROPE, CORDAGE & GENERAL MACHINERY

YOUR INQUIRIES ARE INVITED

A Review of Recent Wire Patents

No. 2,092,074, WIRE INSULATING MACHINE, Patented September 7, 1937, by John J. Keyes, Pittsburgh, Pa., assignor to Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., a corporation of Pennsylvania.

The insulating material is directed tangentially upon the wire, after which a demountable centrifugal presser produces an ironing operation on the material being wrapped, the presser having a device for changing the position of its center of gravity to adjust the centrifugal force on the material for a given speed of the material feeding device.

✦ ✦ ✦

No. 2,092,188, PROCESS AND APPARATUS FOR DRAWING METAL STRIPS, Patented September 7, 1937, by Aaron Simons, New York, N. Y.

The method includes non-rotatably passing flat strips between two drawing surfaces disposed in parallel planes and moving the surfaces in frictional contact with opposite sides of the strips and in directions having opposite components at right angles to the direction of movement of the strips, so that the drawing surfaces carry away the friction created by the drawing of the strips.

✦ ✦ ✦

No. 2,094,663, SPRING BED BOTTOM, Patented October 5, 1937 by Reinhold W. Marquardt, Milwaukee, Wis.

An object of this invention is to provide a bed bottom structure which will minimize recoil of the coil springs. It is claimed that a full-floating base is provided upon which the springs are carried.

✦ ✦ ✦

No. 2,095,076, METHOD OF COVERING WIRE, Patented October 5, 1937 by John W. Olson, Hastings on Hudson, N. Y., assignor to Anaconda Wire & Cable Company, New York, N. Y., a corporation of Delaware.

This is a continuation in part of the inventor's patent No. 2,048,886 of July 28, 1936. A single strip is advanced in the direction of the wire conductor and simultaneously bent around, twisted and crumpled as the conductor advances.

✦ ✦ ✦

No. 2,095,105, PROCESS OF TREATING METAL SURFACES, Patented October 5, 1937 by Henry M. Smith, Scotia, N. Y., assignor to General Electric Company, a corporation of New York.

This process is for polishing wire heating members, such as tungsten wire, for electric lamps and the like.

✦ ✦ ✦

No. 2,095,153, FASTENER, Patented October 5, 1937 by Heyman Rosenberg, New York, N. Y.

The inventor describes this as an improvement on the screw disclosed in patent 1,545,471 dated July 7, 1925. It is stated that the screw of the later patent may be manufactured at a reduction in cost.

✦ ✦ ✦

No. 2,095,461, METHOD OF LUBRICATING WIRE ROPE, Patented October 12, 1937 by Robert B. Whyte, Kenosha, Wis., assignor to Macwhyte Company, Kenosha, Wis., a corporation of Illinois.

By this method, lubricant may be applied which will not run at room temperature. The wires of the rope itself provide the source for drawing the lubricant from the container and carrying it into the rope structure.

Complete Descriptions and Drawings of Patents May Be Had for 25 cents. Address, Wire & Wire Products, 17 East 42nd St., New York.

No. 2,095,474, APPARATUS FOR AND METHOD OF SHAPING WIRE, Patented October 12, 1937 by Halsey G. Kinder, Kenosha, Wis., assignor to Macwhyte Company, Kenosha, Wis., a corporation of Illinois.

By the use of this apparatus, it is claimed, wire may be rolled accurately to shape in a "Turk's head" of standard construction.

(Please Turn to Page 784)

FIRST

There had to be a good heat treating bath
so we originated LAVITE

THEN

There had to be a better furnace
so we invented the internally heated
LAVITE FURNACE

AND THEN TO

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A Review of Recent Wire Patents

(Continued from Page 783)

No. 2,095,551, METHOD OF AND APPARATUS FOR COMBINING STRANDS, Patented October 12, 1937 by Vaughn L. Johannessen and DeWitt D. Merrick, Cranford, N. J., assignors to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

The wire strands are combined in such a fashion as to produce a repeated sequence of two or more portions having lays of different pitch. The cable, so constructed, is stated to be particularly adapted as an electric conductor.

✦ ✦ ✦

No. 2,095,721, WIRE CABLE, Patented October 12, 1937 by Charles C. Sunderland, New Brunswick, N. J., assignor to John A. Roebling's Sons Company, Trenton, N. J., a corporation of New Jersey.

One of the objects of the invention is to provide a heavy load cable, such as a bridge cable, of the parallel strand type, so constructed that moisture will not penetrate the strands.

✦ ✦ ✦

No. 2,096,320, METHOD AND APPARATUS FOR SAMPLING RODS AND WIRES, Patented October 19, 1937 by Ralph Coleman, Lorain, Ohio, assignor to National Tube Company, a corporation of New Jersey.

It is stated that this apparatus will provide sample chips at a speed considerably greater than the speed of conventional apparatus for sampling rods and wires.

✦ ✦ ✦

No. 2,096,435, SPRING BED BOTTOM, Patented October 19, 1937 by Reinhold W. Marquardt, Milwaukee, Wis.

The objects are somewhat similar to those set out in patent No. 2,094,663, the inventor being the same, and one of the objects of the later patent is to minimize side sway.

✦ ✦ ✦

No. 2,096,448, INSULATED ELECTRIC CABLE, Patented October 19, 1937 by Percy Morgan Clark, Parlin, N. J., assignor to E. I. du Pont de Nemours & Company, Wilmington, Del., a corporation of Delaware.

The wire conductor is coated with a tough, insulating surface film comprising a cellulose derivative, solvent softener, and an incompatible non-volatile mineral oil, with an exuded surface layer of non-volatile mineral oil over the surface film.

✦ ✦ ✦

No. 2,096,537, INSULATED CONDUCTOR, Patented October 19, 1937 by William Colvin, Jr., Troy, N. Y.

It is claimed that this wire conductor has extreme flexibility, each of the individual strands being separately coated with enamel and the twisted assemblage of strands having a flexible insulating coating of enamel.

✦ ✦ ✦

No. 2,096,605, UNIVERSAL SPRING COILING MACHINE, Patented October 19, 1937 by William H. Blount, Worcester, Mass., assignor of one-half to Sleeper & Hartley, Incorporated, Worcester, Mass., a corporation of Massachusetts.

The construction includes manually controlled, power driven, variable speed mechanism to operate the wire cutter at a selected rate, whose ratio relative to that of the wire feed roll may be widely varied.

✦ ✦ ✦

Reissue No. 20,542, LOCKING DEVICE, Patented October 26, 1937 by Harold I. Dyer, Battle Creek, Mich., assignor, by mesne assignments, to Eaton Manufacturing Company, Cleveland, Ohio, a corporation of Ohio.

Original No. 2,035,055 dated March 24, 1936.

The inventor provides a self-locking screw having a pair of axially spaced threaded sections connected by an unthreaded portion, the lead of the thread of one of the sections being offset axially from the lead of the thread of the other section, the screw having an axially extending slot which extends throughout the length of one of the threaded sections so as to divide the same into a pair of portions.

✦ ✦ ✦

No. 2,096,713, DEVICE FOR AND PROCESS OF UNCOILING METAL COILS, Patented October 26, 1937 by Jonathan R. Freeze, Middletown, Ohio, assignor to The American Rolling Mill Company, Middletown, Ohio, a corporation of Ohio.

The construction includes pinch rolls with means for supporting a coil initially so that the leading end of the metal

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withdrawn from beneath may be engaged in the pinch rolls, after which the coil is lowered to the extent of producing a reverse bend of the metal about one of the pinch rolls as it is being withdrawn.

✦ ✦ ✦

No. 2,096,767, BEDSPRING, Patented October 26, 1937 by Harry B. Sklar, Los Angeles, Calif.

In this spring construction, a rod is provided formed with a downwardly opening groove and a spiral spring formed with an offset portion in the top convolution which is disposed entirely within the groove and secured by crimping of the material of the rod close to the groove about the offset portion.

✦ ✦ ✦

No. 2,096,822, SPRING STRUCTURE, Patented October 26, 1937 by John M. Oldham, Detroit, Mich., assignor to L. A. Young Spring and Wire Corporation, Detroit, Mich.

The invention comprises the shaping of the spring structure, as a whole, so that upholstery may be quickly applied or removed therefrom.

✦ ✦ ✦

No. 2,096,840, HIGH TENSION RUBBER INSULATED CABLE, Patented October 26, 1937 by Elisabeth Bormann, Berlin-Charlottenburg, Germany, assignor to Siemens-Schuckertwerke Aktiengesellschaft, Berlin-Siemensstadt, Germany, a corporation of Germany.

About the wire conductor is rubber insulation surrounded by a lead sheath, the insulation having substances of electrically conducting properties admixed with and embedded in its surface portions adjacent the conductor. The admixed and embedded substances are of the class of graphite and soot.

✦ ✦ ✦

No. 2,096,937, THREAD-CUTTING FASTENER, Patented October 26, 1937 by Edward J. McManus, Orange, N. J.

A thread-cutting and self-locking screw fastener is provided, the construction being such that chips cut from the wall of the hole are confined by the fastener and produce a clogging and locking effect upon the fastener thread.

✦ ✦ ✦

No. 2,097,193, WIRE BENDING MACHINE, Patented October 26, 1937 by George Jacobs, Detroit, Mich., assignor of one-half to Emil Goetz, Detroit, Mich.

More specifically, this machine is for forming springs of rod and wire, the wire progressing continuously instead of by a step-by-step motion.

✦ ✦ ✦

No. 2,097,204, WIRE DRAWING, Patented October 26, 1937 by Phineas A. Beaman, Worcester, Mass., assignor to Morgan Construction Company, Worcester, Mass., a corporation of Mass.

The apparatus comprises a pair of machines spaced apart from each other, each having a number of dies arranged in tandem along the side of the machine adjacent to the aisle separating the two machines. Each is also provided with a number of blocks rotatable about vertical axis to draw the wire through the dies with the general direction of travel of the wire the same in both machines. Finishing blocks on both machines are provided and arranged to rotate in the same direction so as to produce coils identical in hand.

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1. The cooperative, confidential services of the Association through which members exchange ideas without identities being revealed and endeavor to help each other in plant management and process problems.
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'Round the World With the Wire Industry

German Notes

THE crash on the world stock exchange and merchandise markets, which was only slightly felt on the German exchanges, has not yet affected the wire export trade. Though business, as in steel, is quieter, the general demand is still well maintained and no price cutting is felt. The fact that Japanese competition does not exist any more has naturally had a great influence upon the Eastern markets. The United States is buying more at present than the same time last year whereas during the first five to seven months of this year, sales to the United States were considerably below that of 1936. American competition in wire products is felt, due, however not so much to the price as the American price is rather high, but to the very short shipment dates which the Continental industry cannot give. In the present nervous times short shipment dates count a great deal. China is buying through Hongkong and Shanghai in spite of the war, but only in very small quantities, whereas Manchukuo buys large lots, and business with Tientsin is now staging a "come back". Latin America and the Near East are buying less than was expected whereas the Dutch Indies, Siam and British India are fair buyers. Germany has just concluded an agreement with New Zealand by which German cables, ropes and netting will find an outlet in this market.

✦ ✦ ✦

German Exports

THE export demand for wire rods is very satisfactory although the bulk is still bought by England. In spite of the good demand the German cartel has decided not to increase the quantities for sale to more than 6,000 to 8,000 tons per month as otherwise the production (about 98,000 tons in September) would not be sufficient to the demand. More wire rods have been recently imported from Luxenbourg and Lorraine.

✦ ✦ ✦

THE official export prices of the IWECO have been increased by 2/6 to 5/ shillings for most markets. This increase, however, is not of importance as the actual prices at which the trade was selling were already higher than these increases since the beginning of the war in China and Japan's inability to export.

✦ ✦ ✦

ALTHOUGH the general demand for wire machinery has been decreasing recently. new orders for this product are still equal to shipments in past months. Japan's purchases are not up to expectations, but Great Britain, Scandi-

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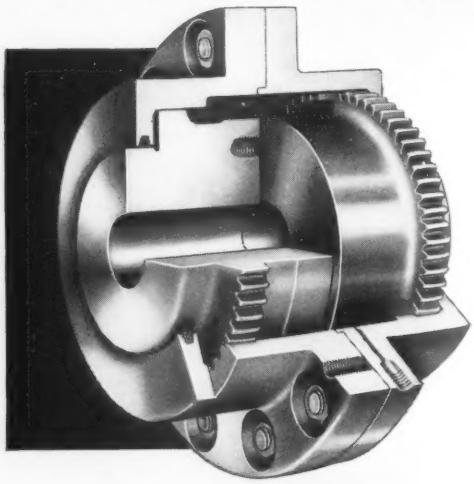

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navia, the Balkans, Australia and also the United States have placed considerable new business. Wire nail machinery and netting machines are in the foreground of interest.

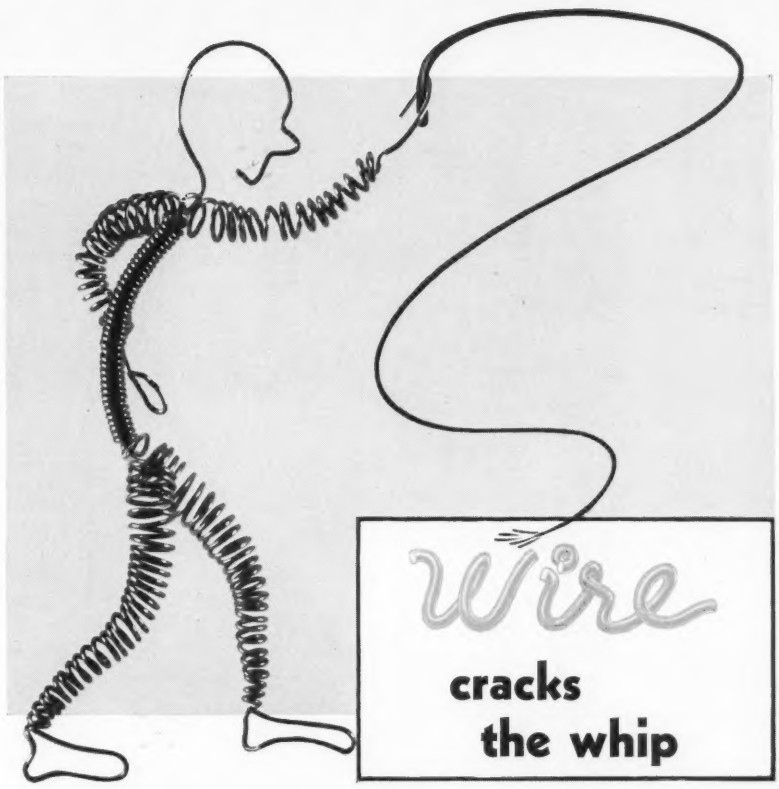
+ + +

BLUED (hardened) steel nails with brass or steel heads of thin sizes (mainly SWG 13-17) have increased in demand both in Europe and for export. The main markets for this product are the West Indies, some Latin American markets and the Balkans and in the past two or three months, the African Colonies and New Zealand also started to buy. The average price of £15.0-17.0, according to size, is much above wire nails, but buyers claim to get better results as the quantity per pound is greater, less waste and better nailing is obtained. Only a few factories specialize so far in this product which probably will find a still wider application in the near future.

+ + +

Another Reduction in Firthaloy Prices

FIRTH-STERLING Steel Company has announced a further reduction in price on rough drilled Firthaloy dies. This reduction is below the recently announced reduced prices. Prices on pages 4 and 6, Bulletin No. 6, for Rough Drilled Dies (RDD) now take the lower price shown for Rough Cored Dies (RCD). The new Bulletin No. 6 effective November 15th shows, for instance, that R-3 rough drilled dies are priced at $6.00 each in lots of 1,000 and over. These rough drilled dies can now be purchased at the rough cored die price of $4.65 each. This reduction applies to die sizes to and including R-6 shown on pages 4 and 6 Bulletin No. 6. The reduction does not affect the recently established return and salvage allowances. The prices are also reduced on dies of non-standard dimensions, making old sizes available at standard prices. These substantial reductions apply for a limited time only. Those who have not received a copy of the new Firthaloy Bulletin may obtain one by addressing FIRTH-STERLING STEEL CO., McKeesport, Pa.



and Production Steps Lively

The right wire can make production move along with snap and precision. Delays, sluggishness, and rejections drop out and output jumps. What *is* the right wire? Maybe you've found it. Yet there's just a chance that Keystone's technical staff could offer a suggestion or two. Give them a go at it! No obligation, of course. Just write, and see if Keystone wire could give a helpful prod to production.

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Bright . . . Tinned
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Annealed
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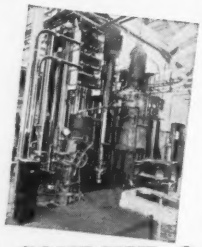
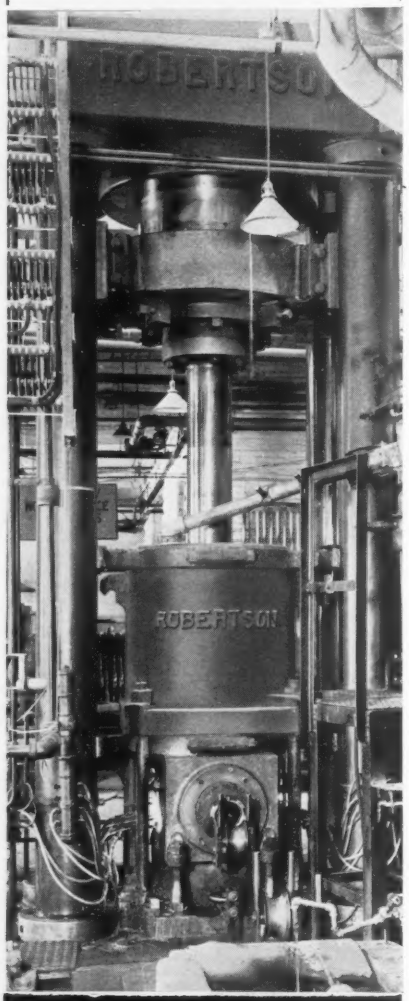


TRIANGLE CONDUIT & CABLE COMPANY



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Outstanding Personalities of the Wire Industry

(*Continued from Page 779*)

MR. Sleeper recently created a plan to perpetuate the business of Sleeper & Hartley, Inc. completing all arrangements for continuing the same Management of the business, thus making certain that its large clientele and general industry would continue to receive the same courteous, efficient and prompt service they have always enjoyed.

✦ ✦ ✦

Daniel C. MacDonald, Superintendent Wire Mill, Sydney Plant, Dominion Steel and Coal Corp.

IT is with great pleasure that we advise of the appointment of Mr. Daniel C. MacDonald of the Dominion Steel and Coal Corporation to the position of superintendent of the wire mill Sydney, Nova Scotia, as of November 1st.

✦ ✦ ✦

C. B. Lang, Managing Director, Subsidaries of Dominion Steel & Coal Corp.

MR. C. B. Lang, vice-president in charge of all steel sales of the Dominion Steel & Coal Corporation has been made managing director of all subsidiaries.

✦ ✦ ✦

THE Dominion Steel & Coal Corporation Ltd. have also purchased the entire plant and business of the Graham Nail & Steel Products Company of Toronto. This subsidiary will also be administered by C. B. Lang as managing director.

✦ ✦ ✦

E. I. Evans General Superintendent Republic Steel In Gadsden District

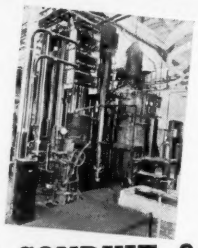
EDWARD I. EVANS, assistant district manager for the Buffalo district, Republic Steel Corporation, has been promoted to general superintendent of the Gulfsteel district with headquarters in Gadsden, Ala.

✦ ✦ ✦

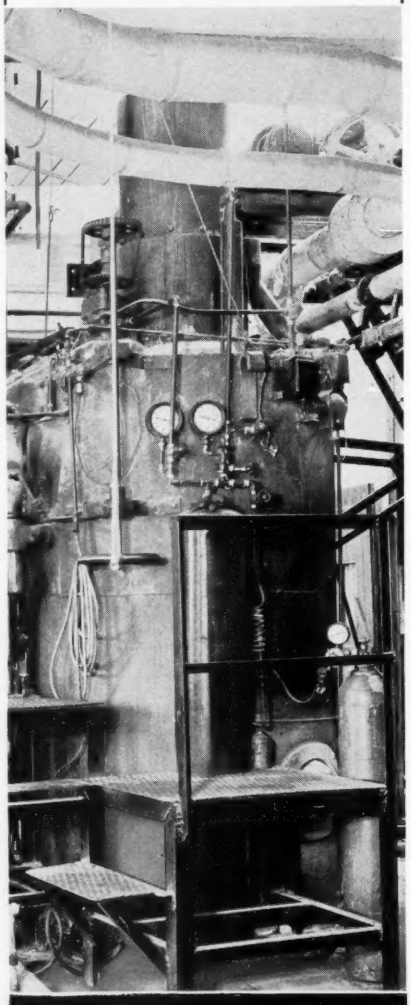
MR. Evans was born in Glasgow, Scotland, in 1887 and started

(*Please turn to Page 791*)

AT



TRIANGLE CONDUIT & CABLE COMPANY



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Two New Developments In Galvanizing

AT the meeting of the Wire Association at Atlantic City, N. J., in October, two major developments in galvanizing were announced by W. H. Spowers, Jr., Consulting Galvanizing Engineer. These two developments are particularly applicable to the wire field.

✦ ✦ ✦

ONE of the most expensive problems facing many wire galvanizing plants is the necessity of more or less frequent replacement of galvanizing kettles. Mr. Spowers stated a material has been perfected for lining these kettles, which is impervious to the action of zinc. This material when fused to the inside of the kettle, eliminates the dissolving away of the steel due to the attack of the moulten zinc. Two advantages accrue from this development (1) The elimination of the necessity for replacement of kettles and (2) the elimination of that portion of the dross made from the iron dissolved off of the steel kettle.

✦ ✦ ✦

LABORATORY tests extending over a long period of time have been very successful as were semi-commercial tests and the first commercial installation has now been in constant operation for some months with every expectation of permanency and low dross loss.

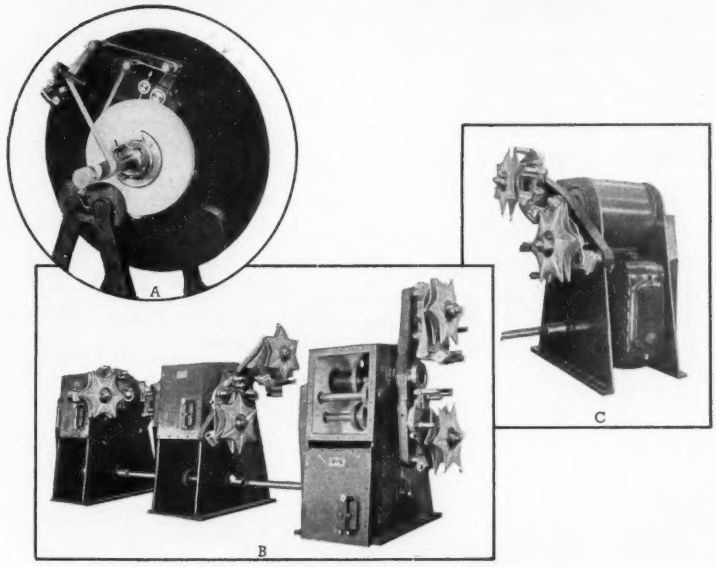
✦ ✦ ✦

MR. SPOWERS also stated that a blanketing material for the surface of the metal bath had also been perfected. This material when placed over the surface of a wire kettle will form a blanket of inert gas over the entire surface. It may be threaded through, and zinc may be fed through it. Its economical features are (1) the elimination of zinc oxide formation with its attendant loss and the conservation of much of the heat now lost by radiation.

✦ ✦ ✦

BOTH of these developments are the result of a definite program for the elimination of the three bug-bears of galvanizing—dross—kettle deterioration — and oxide formation.

ES Taping Machines for Cambric and Paper



TAPING HEADS

TAPING machines can be used for applying paper, (for high tension cables) cambric, rubber filled tape and other materials to cables up to 4" diameter with tapes up to 4" wide.

The taping device can be of the concentric type or the eccentric type where two, three or four taping devices are mounted on one stand. Both types of taping devices are provided with means for pre-determining tape tension.

Tension values are maintained uniform throughout the entire package, as well as during accelerating and decelerating periods. Each taping device is calibrated to permit operator to pre-set tension values.

✦ ✦ ✦ ✦ ✦ ✦

High Speed Insulating Machines For Use With Paper — Cotton — Silk

Saturating and Finishing Equipment For Weatherproof and Code Wire

A Complete Line, Minimum Slip, High Speed Efficient **WIRE DRAWING** Machines for Quality Work.

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WORKS
RAHWAY, N. J.

Electrodeposition of Wire Drawing Lubricants

(*Continued from Page 758*)

ELECTRODEPOSITION of fat and oil emulsions under similar conditions showed no advantage whatsoever, due, it is believed, to the fact that the films deposited were not solid and adhesive in nature, but were merely concentrated around the wire largely in their original state. High speed drawing might, however, bring out the advantage as far as lubrication is concerned, of electrodeposition of fat or oil emulsions.

✦ ✦ ✦

WITH soaps which were difficultly soluble in cold water, heat was necessary to obtain good results with electrodeposition.

✦ ✦ ✦

Summary and Conclusions

Electrodeposition has been demonstrated to be advantageous in obtaining superior lubrication when using certain wet drawing lubricants. Whether or not superior lubrication results from electrodeposition depends, to a large extent, on the physical nature of the deposited film.

As far as practical applications are concerned the current densities involved are reasonable (ranging from .003 Amp. to .16 Amp. per sq. in., the latter being unnecessarily high.)

The time of electrical contact necessary to deposit an effective lubricant film can be as short as 1/10 second, thereby indicating possible application on rod reduction continuous machines under proper conditions.

Lubricant has been deposited electrically on both non-ferrous and ferrous rods satisfactorily.

✦ ✦ ✦

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(1) **Williams, Robert C., Wire & Wire Products 10, 145 (1935).**

(2) **Williams, Robert C., J. Phys. Chem. 36, 3108 (1932).**

✦ ✦ ✦

TABLE II

Effect of pH on Lubrication by Soap Solution subjected to Electrodeposition. 0.225% Sodium Soap Solution.

Volts	Per Cent Reduction in Pull on Die			
	pH 7.5	pH 9.5	pH 10.2	pH 11.8
1.0	6	0	..	..
1.9	8	29	17	17
3.75	10	29	30	41
7.5	10 erratic	33	46	44
15.0	10 erratic	36	46	44
22.5	..	38	46 erratic	44
30.0	0	40	46 erratic	44 erratic

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A weekly for the wire industry and related lines.

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Germany

3,016,000,000 Feet of Fine Copper Wire Used By Warren Telechron Co., Annually

OVER 100,000 pounds of copper wire of approximately the diameter of a human hair will be used by the Warren Telechron Company in Ashland, Massachusetts, in the construction of coils for its synchronous electric clocks this year.

✦ ✦ ✦

THIS wire, which averages about 28,000 feet per pound, adds up to a total running length of 3,016,000,000 feet and if stretched out in a single length would encircle the globe 23.2 times.

✦ ✦ ✦

Circle Wire & Cable Corporation To Erect New Plant In Maspeth

THE Circle Wire & Cable Corporation has purchased from the Long Island Railroad Company a parcel of land containing 360,000 square feet located at Maspeth Avenue and Rust Street, Maspeth, L. I.

✦ ✦ ✦

THE company will build on these premises a plant having a floor space of approximately 200,000 square feet. This move represents the initial step of the expansion program outlined by the company's directors.

✦ ✦ ✦

THE company had decided that it was necessary to move from its present quarters because of insufficient manufacturing space.

Manufacturers of materials, tools and equipment for wire drawing and forming plants are constantly making improvements and additions to their lines. If you do not find the product or service in which you are interested, additional information will be supplied promptly. Simply address:

WIRE & WIRE PRODUCTS

17 East 42nd St. New York City

Outstanding Personalities of the Wire Industry

(*Continued from Page 788*)

his steel career in that city at the age of 12. He came to the United States in 1907 and became associated with the Worth Steel Company at Coatesville, Pa., working in the open hearth department. In 1915 he joined the United States Steel Corporation at its Duluth plant and in 1916 returned to the Worth Steel Company, now the Midland Steel Company as assistant bolt and nut superintendent. Two years later when Midland Steel removed its plants to Claymont, Del., he was made open hearth superintendent. In 1929 he joined Bourne-Fuller Company, Cleveland as general manager, and three years later was made assistant manager of the Canton district for Republic Steel Corporation. His next move was to Buffalo in 1934 where he held the position of assistant district manager.

✦ ✦ ✦

Charles B. Fantone Heads Wire Division Sales For Elevator Supplies Co., Inc.

CHARLES B. Fantone, well known throughout the Wire Industry as President of the Syncro Machine Company, has in addition to his present activity with Syncro, taken over the field sales of wire machine equipment for Elevator Supplies Company, Inc.

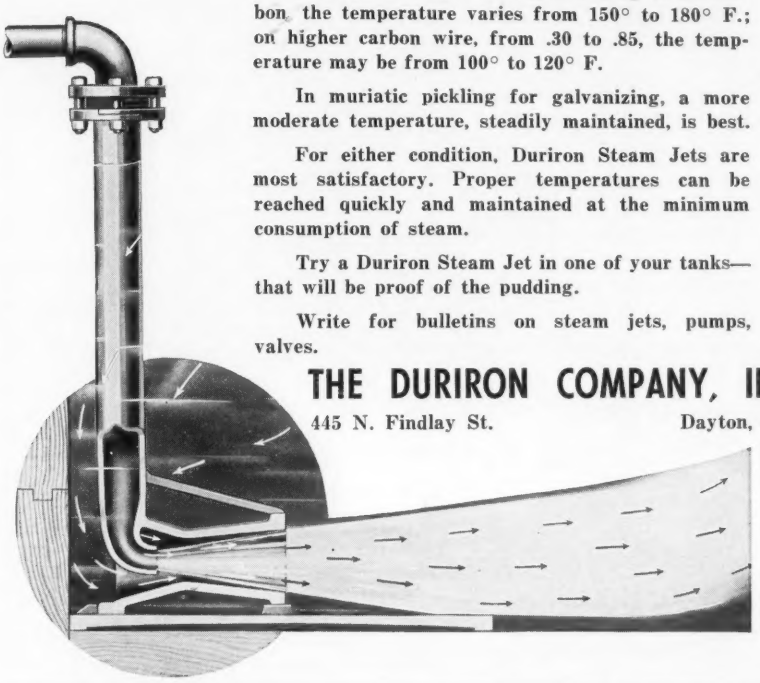
✦ ✦ ✦

THE close relationship of wire-drawing and wire-insulating machine construction, design and performance necessitating a co-related activity in the field of sales and service is emphasized in the decision of the Syncro and Elevator Supplies group to concentrate the field activity to one focal position with the view of better serving the Wire Industry as a whole.

✦ ✦ ✦

MR. Fantone has well earned his spurs, having originally designed, developed and manufactured the Syncro Wire Insulating machines which are proving so satisfactory in the field today.

To heat – circulate – agitate Pickle Liquor



In sulphuric acid cleaning of rod up to .25 carbon, the temperature varies from 150° to 180° F.; on higher carbon wire, from .30 to .85, the temperature may be from 100° to 120° F.

In muriatic pickling for galvanizing, a more moderate temperature, steadily maintained, is best.

For either condition, Duriron Steam Jets are most satisfactory. Proper temperatures can be reached quickly and maintained at the minimum consumption of steam.

Try a Duriron Steam Jet in one of your tanks—that will be proof of the pudding.

Write for bulletins on steam jets, pumps, valves.

THE DURIRON COMPANY, INC.

445 N. Findlay St. Dayton, Ohio

American Steel & Wire Co. Announces Changes in Metallurgical Personnel

FOUR personnel changes in the Metallurgical Department of the American Steel & Wire Co., a United States Steel Corp. subsidiary, have been announced by M. W. Reed, Vice-President of the Wire Company, under whose department the metallurgical division operates.

CHARLES B. FANTONE
President, Syncro Machine Co. and Manager, Wire Sales, Elevator Supplies Co., Inc.

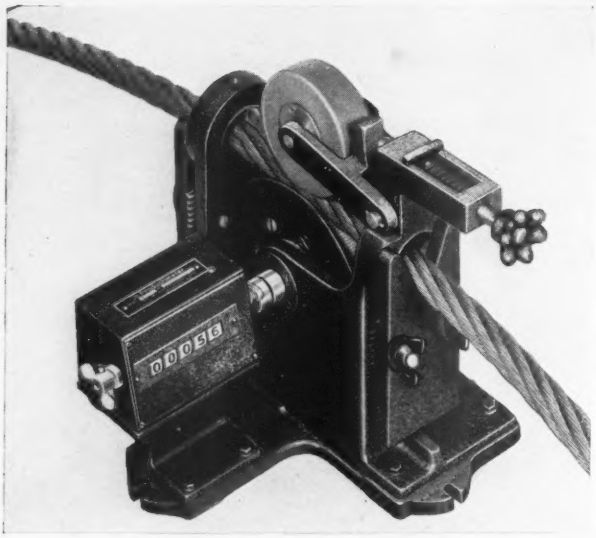
✦ ✦ ✦

J. R. THOMPSON has been appointed Assistant Manager of the company's Metallurgical Department at Cleveland; L. H. Dunham has been made District Metallurgist of the Chicago district; R. H. Barnes takes a similar post in Cleveland and R. R. Leo has been appointed Assistant Division Metallurgist at Cleveland.

✦ ✦ ✦

E. L. Stevens, of Union Wire Rope Corporation, Dies Suddenly

EDWARD L. Stevens, for the past year manager of sales of commercial wire rope for the Union Wire Rope Corporation, of Kansas City, died suddenly of heart failure while occupied at his desk, recently. His secretary heard him gasp for breath and saw him fall to the floor. Death occurred before anyone could reach his side.



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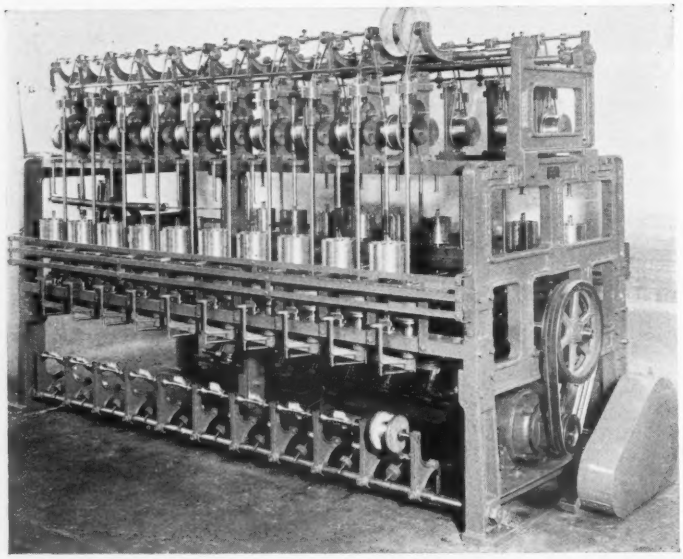

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Wire Association Technical Meeting

(*Continued from Page 775*)

Baker" conducted by Kenneth B. Lewis, consulting wire mill engineer, Worcester, Mass.

✦ ✦ ✦

MR. McCarthy's paper, which received the Wire Association Medal Award, was a description and continuation of the work on this subject which he originally announced two or three years ago.

✦ ✦ ✦

MR. McCarthy's excellent review of the subject of grain growth phenomena encountered in cold worked low carbon steels when subjected to temperatures below the AC range, supplemented by his presentation and discussion of slides showing structures obtained in his own experiments, was received with much interest by the members and guests of the Wire Association. The lively discussion following the paper made this meeting one of the most satisfactory and informative sessions in the history of the Association. The fact that these discussions contributed by the members were entirely extemporaneous and that none had been specially prepared for formal presentation is noteworthy.

✦ ✦ ✦

THE discussion on the **Flash Baker** conducted by Mr. Lewis developed that the pickling time range ranged from 20 to 25 seconds up to 5 or 6 minutes on heavy coated stock, and that in one plant using 32-cent natural gas, the fuel cost for operating this type baker averages between 4 and 4½c per ton.

✦ ✦ ✦

AT the Wednesday morning nonferrous session two papers were presented: **"The Need of a Better Quality of Copper in Apparatus Manufacture"** by L. H. Burnham, Development and Power Transformer Engineer, General Electric Company, Pittsfield, Mass., and a paper entitled **"The Manufacture of Fourdrinier Wires"** by Hugh E. Brown, Director of Research, W. S. Tyler Company, Cleveland, Ohio.

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MR. Burnham's paper pointed out that many electrical apparatus failures were caused by defects in the copper wire supply and stressed the consequent necessity for the elimination of rod and wire imperfections.

✦ ✦ ✦

MR. Brown in his paper brought out that there was a field for large tonnages of fourdrinier and weaving wires in the United States and urged American manufacturers to cooperate in developing wire suitable for this purpose.

✦ ✦ ✦

THE discussions on both papers were very interesting and will be found in detail in the typewritten Proceedings which will be forwarded to everyone who registered for the meetings.

✦ ✦ ✦

AT the Wednesday afternoon non-ferrous session a paper entitled **"Production of Copper from Mine to Mill"** was presented by William H. Bassett, Jr., Manager Metallurgical Development, Anaconda Wire & Cable Co., Hastings-On-Hudson, N. Y., followed by a moving picture **"Noranda Enterprises"**.

✦ ✦ ✦

MR. Bassett's paper was largely historical but included a description of the refinements and improvements made in the physical characteristics of copper in recent years which have resulted in the production of better copper wire bars.

✦ ✦ ✦

THE moving picture was most interesting and instructive to those interested in the production of copper and thanks are due to the Canada Wire and Cable Company for securing the film for the meeting.

✦ ✦ ✦

ON Thursday morning the papers were devoted to nickel and nickel base alloys in wire and rod production. The paper by Carl Rolle, Development and Research Division, The International Nickel Co., Inc., New York, N. Y., was entitled **"Nickel and Nickel Base Alloys in Wire and Rod Products"** and

(*Please turn to Page 794*)

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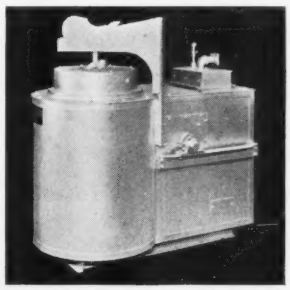

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Wire Association Technical Meeting

(*Continued from Page 793*)

the paper by T. C. Merriman, Metallurgist, Seymour Manufacturing Co., Seymour, Connecticut, was **"Notes on the Annealing of Nickel Silver Wire in Coils".**

✦ ✦ ✦

MR. Rolle's paper was presented by Gill Cox of the International Nickel Company in the absence of Mr. Rolle and brought out the fact that due to excellent corrosion resistance and the fact that nickel is non-destructive and non-toxic that corrosion of monel, inconel and nickel metals amounts to practically nothing even in sulphurous atmospheres.

✦ ✦ ✦

MR. Merriman emphasized the desirability of slow heating at low temperature rather than working at high temperatures in connection with annealing of nickel silver wire in coils, and that it was better practice to pull a load into the furnace at a comparatively low temperature and let it heat slowly before actively raising the furnace temperature to that at which it is desired to let the load of metal soak.

✦ ✦ ✦

IN the afternoon session papers were presented by D. W. McDowell, Metallurgist. Union Drawn Steel Company, Chicago, Ill., on **"Cold Drawn Bars"** and by Charles Fassinger, Vice President, Oliver Iron and Steel Corp., Pittsburgh, Pa., on **" 'Double Treating' Track and Frog Bolts".**

✦ ✦ ✦

IN connection with Mr. McDowell's paper there was some discussion, particularly on shapes, also on cold drawing of bars.

✦ ✦ ✦

MR. Fassinger's paper on the making of bolts created considerable discussion and some good points were brought out. While this paper was aside from the actual production of wire and was really in the manufacturing field, it proved to be of great interest to all present and many stated that it would enable them to be familiar with requirements and what is necessary for the manufacture of certain parts.

THE Bethlehem Steel Company's moving picture **"The Making of Steel Wire"** was presented on Tuesday and Thursday afternoons, showing the entire process from the iron ore to the finished wire and was thoroughly enjoyed by all who saw it.

✦ ✦ ✦

AT the Wednesday morning meeting, Mr. W. H. Spowers, Jr., Consulting Galvanizing Engineer, New York, N. Y., announced the development of a new enameled coated pot which was impervious to any action of a bath of molten zinc contained therein.

✦ ✦ ✦

SUMMARIZING the meeting, Mr. F. A. Westphal, Superintendent of Wire Mills, Sheffield Steel Corporation, Kansas City, Mo., vice president of the Wire Association, stated:

"It is believed that the membership and officers of the Association should be gratified by the fine interest shown, the performance of the various speakers, the high quality of the papers presented, and finally, the excellent quality of good fellowship formed with executives from the various companies of our country as well as other nations. The opportunity for the making of new friends and contacts was nicely exemplified by the good fellowship and willingness to exchange ideas that existed throughout the meetings and Convention."

✦ ✦ ✦

COMMENTING on the meetings, D. D. Buchanan, Assistant General Manager, Union Drawn Steel Company, Massillon, Ohio, stated:

"With reference to the meetings in general, I feel that this year was outstanding in the presentation of papers and also the discussions. The thing that impressed me most was the attendance and close attention paid to the papers and discussion, and I know that any one who attended certainly should derive benefit from these meetings.

"In watching the growth of this Association and from remarks heard from members prominent in the metal section, it is apparent that there is a general realization that the Wire Association has gone forward fast and is now a real factor, not only in the wire industry, but from a manufacturing and metallurgical standpoint, as there has been a greater amount of research work done by this Association as compared with many in the heavier industries."

✦ ✦ ✦

DR. S. A. Braley, Industrial Fellow, Mellon Institute of Industrial Research, University of Pittsburgh, Pittsburgh, Pa., writes:

(*Please turn to Page 796*)

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Wire Association Technical Meeting

(*Continued from Page 795*)

"I feel this meeting of the Wire Association surpassed in interest any of those previously held, and I am indeed gratified in the advance the Wire Association is making. I feel that with each succeeding meeting a great amount of friendship is formed between the various men of the wire industry and the barriers set up by long years of fear of competition are gradually being broken down so that much more freedom of discussion results. Personally, I feel that this is a great advance and one which all those interested in the wire industry should very much appreciate."

✦ ✦ ✦

THE comment was general that more time should be allotted for discussions, and if necessary fewer papers presented in order that each subject presented could be more thoroughly covered. At the meeting to be held in Detroit next October in association with the National Metal Congress, it is quite probable that this suggestion, which has been so universally made, will be followed.

✦ ✦ ✦

Wire Association New Members

BROTEN, O. A., Vice President,
National Pneumatic Co.,
Chicago, Ill.

CURRAN, JOHN B., Proprietor,
Sealcap Oil Company,
Philadelphia, Pa.

DENNIS, WALTER J., Sales Dept.,
Illinois Tool Works,
Chicago, Illinois.

FRASER, JOHN G., Manager
Northern Bolt, Screw & Wire Co., Ltd.,
Owen Sound, Ontario, Canada.

GOLDSCHMIDT, E. L., Sales Manager,
The Volco Wire Co., Inc.,
Kenilworth, N. J.

HAGNER, RANDALL, Research Laboratory,
Owens-Illinois Glass Co.,
Newark, Ohio.

HARTWELL, RALF L., Asst. to Pres.,
Metal Textile Corp.,
West Orange, N. J.

HOPKINS, H. L., Metallurgist,
National Screw & Mfg. Co.,
Cleveland, Ohio.

KESTER, FREDERICK H., Gen. Mgr.,
Canadian Bridge Co., Ltd.,
Walkerville, Ontario, Canada

KLEIN, H. C., Sales Engineer,
B. F. Goodrich Company,
Akron, Ohio.

MILLER, HERBERT, Salesman,
Master Wire Die Corp.,
New York City.

SEIBERT, JOHN C., Metallurgist,
Bethlehem Steel Company,
Johnstown, Pa.

SOMMER, LESTER B., Asst. to Pres.,
Mid States Steel & Wire Co.,
Crawfordsville, Ind.

WARD, C. T., Asst. Supt.,
Bethlehem Steel Co.,
Johnstown, Pa.

WEINMANN, E. R., Sales Manager,
Nukem Products Corp.,
New York City.

WERME, M. G., Plant Supt.,
Wickwire Spencer Steel Co.,
Clinton, Mass.

WESSEL, E., Vice President,
Beall Tool Co.,
East Alton, Ill.

WOODHEAD, R. R., Research Engr.,
John A. Manning Paper Co., Inc.,
Troy, New York.

WOODSON, C. C., Superintendent,
Beall Tool Company,
East Alton, Ill.

ZARAFU, HERMAN, Plant Engineer,
Circle Wire & Cable Co.,
Brooklyn, N. Y.

✦ ✦ ✦

Electric Instrument Springs

(*Continued from Page 771*)

torque measured, not in inches and ounces, but in much smaller units —millimeters and milligrams. By this classification a spring is chosen that exactly fulfills the engineers' specifications.

✦ ✦ ✦

IN this workshop are four small rooms. In two, frost covers the window panes; the temperatures within are four and forty degrees below zero, respectively. The other two rooms are maintained at the torrid temperature of 122 Fahrenheit, and one of the two is a miniature tropical jungle dripping with moisture, for the humidity within is 100 per cent. In each of these rooms a representative collection of meters and instruments proves, by withstanding unnatural conditions, that every instrument is fit to meet the severest tests that ordinary service can offer.

✦ ✦ ✦

"ALTHOUGH these instruments are referred to as delicate measuring devices, and the small springs and coils which go into them are emphasized, they are ruggedly constructed to withstand almost any condition," a company's statement pointed out. "These meters and measuring devices must all pass a severe vibration test before they leave the factory so that they may stand up if used in a locomotive cab, on an airplane dashboard, or in some industrial plant where there may be excessive vibration. In other words, these instruments are delicate in the sense that they can measure the smallest quantities, but rugged in the sense they can withstand 'most any condition subjected to."

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More About Charged Agricultural Fences

(*Continued from Page 761*)

THE concensus of opinion was that farmers as a class neglected their equipment, that if the fences did not have enough juice to do the work the average farmer would tie some baling wire around the transformer and put more juice on the fence wire thus creating a dangerous situation, and that in view of the possibilities of accidents those present would not advocate the use of such fences.

✦ ✦ ✦

A WELL known farm paper editor takes the position that electric fence at the present time is impractical for general use because of the variable uncertainties, hazards and other existing conditions on a farm and lists such conditions as follows:

The mystery of electricity.
Absence of perfected devices.
Possible defect or failure in any device.
Tampering with device.
Tall grass and weeds.
Dry ground.
Wet ground.
Natural lightning.
Negligence of farmers.
Children's curiosity.
Rain, snow, ice and wind.
Frightening of animals and particularly dairy cows.
No legal standing as division fences and highway fences.
Human nature.

✦ ✦ ✦

IT is quite apparent that a wide diversity of opinion exists as to the value of such fences at the present time as compared with the regular woven wire fencing and multiple strands of barbed wire which have been used as standard fences for many years and that it will be some time before electrically charged fences are in wide and general use.

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Wire Mill Equipment, Stranding, Insulating, Drawing, Welding
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Rusch Wire Die Corp., New York, N. Y.
Vianney Wire Die Works, New York, N. Y.

DIES—Rod and Tube Drawing
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Master Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Vanadium Alloys Steel Co., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.

DIES—Tantalum Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Kelly Wire Die Corp., New York, N. Y.
Master Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Vanadium Alloys Steel Co., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y

DIES—Tungsten Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Master Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Vanadium Alloys Steel Co., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.

BUYERS' GUIDE, Continued

DIES—Wire Drawing
Detroit Wire Die Co., Detroit, Mich.

DRAW BENCHES—
H. J. Ruesch Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.

ENGINEERS—Consulting Wire Mill
Gould, William, New York, N. Y.
Lewis, Kenneth B., New York, N. Y.

ENGINEERS—Spring
Gould, William, New York, N. Y.
Rockefeller, J. W., Jr., New York, N. Y.

EQUIPMENT—Insulation Testing
Leeds & Northrup Co., Philadelphia, Pa.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FILLERS—Paper for Cable
E. W. Twitchell, Inc., Phila., Pa.

FURNACE CONTROLS — Combustion
Leeds & Northrup Co., Philadelphia, Pa.

FURNACE CONTROLS—Draft
Leeds & Northrup Co., Philadelphia. Pa.

FURNACES—Annealing
Bellis Heat Treating Co., Branford, Conn.
Electric Furnace Co., Salem, O.
Leeds & Northrup Co., Philadelphia, Pa.
Lindberg Engineering Co., Chicago, Ill.
Surface Combustion Co., Toledo, O.

FURNACES—Automatic
Bellis Heat Treating Co., Branford, Conn.
Electric Furnace Co., Salem, O.
Leeds & Northrup Co., Philadelphia, Pa.
Lindberg Engineering Co., Chicago, Ill.
Surface Combustion Co., Toledo, O.

FURNACES—Bright Annealing
Bellis Heat Treating Co., Branford, Conn.
Electric Furnace Co., Salem, O.
Lindberg Engineering Co., Chicago, Ill.
Surface Combustion Co., Toledo, O.

FURNACES—Electric
Bellis Heat Treating Co., Branford, Conn.
Electric Furnace Co., Salem, O.
Leeds & Northrup Co., Philadelphia, Pa.
Lindberg Engineering Co., Chicago, Ill.

FURNACES—Hardening and Tempering
Electric Furnace Co., Salem, O.
Leeds & Northrup Co., Philadelphia, Pa.
Surface Combustion Co., Toledo, O.

FURNACES—Lead Melting
Electric Furnace Co., Salem, O.
Lindberg Engineering Co., Chicago, Ill.
John Robertson Co., Brooklyn, N. Y.
Surface Combustion Co., Toledo, O.

FURNACES—Non-Oxidizing
Bellis Heat Treating Co., Branford, Conn.
Electric Furnace Co., Salem, O.
Lindberg Engineering Co., Chicago, Ill.
Surface Combustion Co., Toledo, O.

FURNACES—Normalizing
Leeds & Northrup Co., Philadelphia, Pa.

FURNACES—Wire, Strip & Sheet
Bellis Heat Treating Co., Branford, Conn.
Electric Furnace Co., Salem, O.
Lindberg Engineering Co., Chicago, Ill.
Surface Combustion Co., Toledo, O.

GEARS—Wire Mill
Farrel-Birmingham Co., Ansonia, Conn.

GRINDERS—Roll
Farrel-Birmingham Co., Ansonia, Conn.
Norton Co., Worcester, Mass.

HANDLING EQUIPMENT — Material
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

HOISTS—Electric Traveling
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

HOISTS—Monorail
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

INHIBITORS
American Chemical Paint Co., Ambler, Pa.
Parkin, Wm. M., Co., Pittsburgh, Pa.

INSTRUMENTS—Electrical
Leeds & Northrup Co., Philadelphia, Pa.

INSULATION — Cable or Cable Filler
E. W. Twitchell, Inc., Phila., Pa.

LATHES—Die Reaming
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

LIME—Pulverized
Warner Co., Bellefonte, Pa.

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Magnus Chemical Co., Garwood, N. J.

LUBRICANTS—Wire Drawing
Magnus Chemical Co., Garwood, N. J.
R. H. Miller Co., Homer, N. Y.

MACHINERY—Armoring (Cable, Wire Hose)
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Rahway, N. J.
New England Butt Co., Providence, R. I.
John Robertson Co., Brooklyn, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Braiding
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Brazing
Thomson-Judd Wire Machinery Co., Lynn, Mass.

MACHINERY—Bunching
Amer. Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cable, Electric
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Rahway, N. J.
New England Butt Co., Providence, R. I.
Thomson-Gibb Electric Welding Co., Lynn, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Chain Making
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Closing
New England Butt Co., Providence, R. I.
Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coil Winding
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Coilers
Broden Construction Co., Cleveland, O.
Elevator Supplies Co., Inc., Rahway, N. J.
Farrel-Birmingham Co., Ansonia, Conn.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Copper Wire Drawing and Rolling
Elevator Supplies Co., Inc., Rahway, N. J.
Farrel-Birmingham Co., Ansonia, Conn.
H. J. Ruesch Machine Co., Newark, N. J.
Torrington Mfg. Co., The, Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Cutting
Broden Construction Co., Cleveland, O.
Farrel-Birmingham Co., Ansonia, Conn.
Hallden Machine Co., Thomaston, Conn.
Lewis Machine Co., The, Cleveland, O.
F. B. Shuster Co., New Haven, Conn.
W. A. Schuyler, New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Enameling
Amer. Insulating Mach'y Co., Phila., Pa.

MACHINERY—Extruding
John Robertson Co., Brooklyn, N. Y.
Royle, John & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Flat Wire
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Forming
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Galvanizing Wire
Broden Construction Co., Cleveland, O.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Gang Winders
H. J. Ruesch Machine Co., Newark, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., Worcester, Mass.

MACHINERY—Insulating
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Rahway, N. J.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lead Encasing Presses, etc.
John Robertson Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
John Robertson Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Magnet Wire
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Rahway, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Material Handling
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MACHINERY — Measuring Wire & Cable
Durant Mfg. Co., Milwaukee, Wis., and Providence, R. I.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Glader, Wm., Machine Works Co., Chicago, Ill.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Panning
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Rahway, N. J.

MACHINERY—Pointing
Broden Construction Co., Cleveland, O.
Elevator Supplies Co., Inc., Rahway, N. J.
H. J. Ruesch Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Rod Mill
Broden Construction Co., Cleveland, O.
Farrel-Birmingham Co., Ansonia, Conn.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
W. A. Schuyler, New York, N. Y.

MACHINERY—Rolling Mill
Broden Construction Co., Cleveland, O.
Farrel-Birmingham Co., Ansonia, Conn.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
Torrington Mfg. Co., The, Torrington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Rubber Strip Covering
Farrel-Birmingham Co., Ansonia, Conn.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Rubber Tubing and Straining
Farrel-Birmingham Co., Ansonia, Conn.
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Screw Wire
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Special
Amer. Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, O.

BUYERS' GUIDE, Continued

Elevator Supplies Co., Inc., Rahway, N. J.
H. J. Ruesch Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY— Special — Combination Machine for Drawing, Cutting-to-length. Straightening and Reeling Bars from Coil in One Operation (Shumag Type)—
W. A. Schuyler, New York, N. Y.

MACHINERY—Spooling
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Rahway, N. J.
Sleeper & Hartley Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spring Making
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Broden Construction Co., Cleveland, O.
Hallden Machine Co., Thomaston, Conn.
Lewis Machine Co., The, Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
W. A. Schuyler, New York, N. Y.
F. B. Shuster, New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Stranding
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Swaging
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Taping
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Rahway, N. J.
New England Butt Co., Providence, R. I.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Testing Size of Wire
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Testing Wire
Henry L. Scott Co., Providence, R. I.

MACHINERY—Tinsel Rolling Mills
Amer. Insulating Mach'y Co., Phila., Pa.

MACHINERY—Trolley Wire
Vaughn Machinery Co., Cuyahoga Fall, O.

MACHINERY—Tube Mill
H. J. Ruesch Machine Co., Newark, N. J.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Welding Wire
Micro Products Co., Chicago, Ill.
F. B. Shuster Co., New Haven, Conn.
Thomson-Judd Wire Machinery Co., Lynn, Mass.

MACHINERY—Winding
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Rahway, N. J.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Drawing
Amer. Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, O.
Elevator Supplies Co., Inc., Rahway, N. J.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
W. A. Schuyler, New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Tinning
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Rahway, N. J.

MACHINERY—Wrapping Wire
Elevator Supplies Co., Inc., Rahway, N. J.
W. A. Schuyler, New York, N. Y.

MATERIAL HANDLING EQUIPMENT—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MILLS—Tandem Rolling and Edging
Torrington Mfg. Co., Torrington, Conn.

MONORAIL SYSTEMS—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

NICKEL SILVER AND PHOSPHOR BRONZE—Rod, Wire and Strip
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

OVENS—Annealing or Drying
Lindberg Engineering Co., Chicago, Ill.

PAPER—Insulating
E. W. Twitchell, Inc., Phila., Pa.

PATENT ATTORNEYS—
Lancaster, Allwine and Rommel, Washington, D. C.

PICKLING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Parkin, Wm. M., Co., Pittsburgh, Pa.

POTS — Annealing, Case Hardening and Tempering
Lindberg Engineering Co., Chicago, Ill.

POTS—Lead Melting
Farrel-Birmingham Co., Ansonia, Conn.
John Robertson Co., Brooklyn, N. Y.

PRESSES—Hydraulic and Mechanical
Farrel-Birmingham Co., Ansonia, Conn.
John Robertson Co., Brooklyn, N. Y.

PRESSES—Lead
John Robertson Co., Brooklyn, N. Y.

PULLERS—Wire
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

PUMPS—Hydraulic
John Robertson Co., Brooklyn, N. Y.

PYROMETERS—
Leeds & Northrup Co., Philadelphia, Pa.

RECORDERS—
Leeds & Northrup Co., Philadelphia, Pa.

REEL AND TENSION STAND—
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REFRACTORIES—High Temperature
Norton Co., Worcester, Mass.

ROD BAKERS—
Morrison Engineering Co., Cleveland, O.

RODS—Stainless Steel
Rustless Iron & Steel Corp., Baltimore, Md.

RODS—Wire—Non Ferrous
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.
Seymour Mfg. Co., Seymour, Conn.

RODS—Wire—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

ROLLS—
Farrel-Birmingham Co., Ansonia, Conn.

RUST PROOF COMPOUND—
American Lanolin Co., Lawrence, Mass.

SHEET—Steel
Continental Steel Corp., Kokomo, Ind.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

SKIN PROTECTOR—
Magnus Chemical Co., Garwood, N. J.

SOAPS—Industrial and Wire Drawing
Magnus Chemical Co., Garwood, N. J.
R. H. Miller Co., Homer, N. Y.

STAINLESS STEEL—
Rustless Iron & Steel Corp., Baltimore, Md.

STRIP—Brass, Zinc and Non Ferrous
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.
Seymour Mfg. Co., Seymour, Conn.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TESTERS—Wire
Henry L. Scott Co., Providence, R. I.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

TREADS—Safety
Norton Co., Worcester, Mass.

TRUCKS
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Fall, O.

TUBE BENDERS AND FORMERS—
H. J. Ruesch Machine Co., Newark, N. J.

VALVES AND FITTINGS—Acid Proof
Duriron Co., The, Dayton, O.

VULCANIZERS—
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS—
Amer. Insulating Mach'y Co., Phila., Pa.

WELDERS—Spot and Butt
Micro Products Co., Chicago, Ill.

WIRE—Cold Heading
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE—Electric
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

WIRE—Enameled For Coils
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Manufacturers
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE—Nickel Silver and Phosphor Bronze
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

WIRE—Non Ferrous to Specification For Special Purposes
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Spring
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Seymour Mfg. Co., Seymour, Conn.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE—Stainless Steel
Rustless Iron & Steel Corp., Baltimore, Md.

WIRE—Steel—Also Coppered Steel—Also Galvanized Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE AND STRIP—Brass, Zinc
Platt Bros. & Co., The, Waterbury, Conn.

WIRE AND WIRE PRODUCTS

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✦ ✦ ✦

THE editorial content is designed to preserve a balance between theory and practice—to be sound, authoritative and unbiased.

✦ ✦ ✦

IN the course of the twelve months, the range of subject matter covered is as broad as the uses of wire.

✦ ✦ ✦

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✦ ✦ ✦

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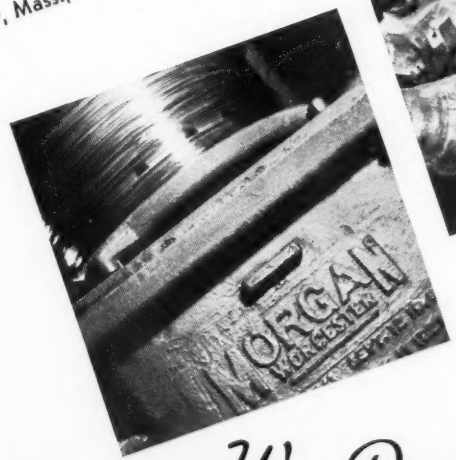

W23

Continuous Wire Drawing Machinery

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